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INDUSTRIAL MEDICINE

Industrial Health, Occupational Medicine and Traumatic Surgery

September, 1947

Medical Services
— In the Shoe Industry —

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— Practical Experiences —

Sodium Fluoride
— In the Manufacture of Steel —

Role of Codes
— In Industrial Hygiene Administration —

Fiberglas Plastics
— Industrial Medical Aspects and Experiences —

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Volume 16 Number 9

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LITERATURE ON REQUEST

1. Shipley, E. R. and Dodd, M. C.: Clinical Observations on Furacin Soluble Dressing in the Treatment of Surface Infections, Surg., Gynec. & Obst. *84*:366, 1947 • 2. Downing, J. G., Hanson, M. C. and Lamb, M.: Use of 5-Nitro-2-Furaldehyde Semicarbazone in Dermatology, J.A.M.A. *133*:299, 1947.

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COMING

American Association of Railway Surgeons
58th Annual Meeting—Chicago, November 23-25, 1947

The AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS will hold its 33rd Annual Meeting at Hotel Statler, Boston, Massachusetts, during and throughout the week beginning Monday, April 29, 1948. Participating in the Industrial Health Conference will be the AMERICAN ASSOCIATION OF INDUSTRIAL NURSES, the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, the AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS, and the AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS.

[NOTE: The opinions expressed in the editorials of this Journal are not to be considered as necessarily representing the opinions of any associated organizations.]

THIS issue is one of substance—solid with information of current and important significance. DR. SAPPINGTON'S abstracts of the presentations at the Industrial Hygiene Meetings of the A.P.H.A. are a textbook in themselves; they're "power-packed." Heavy reading, perhaps, for hot weather—but Summer's on the wane. . . . THE announcement of DR. KEHOE'S new Institute of Industrial Medicine came too late to be featured, but it appears on page 6. Interesting is the new degree "DOCTOR OF INDUSTRIAL MEDICINE". . . . COMMENT and Opinion, beginning on page 12, seems attractive—again, with the numerous newspaper sources for items, it reflects the fast-growing interest on the part of the public in things that pertain to industrial medicine. There's much food for thought in "Attlee's Disease" on page 18. "New Protective Cream," on page 24, also intrigues. Likewise the statement, in "In-Plant Feeding," on page 26, that "nevertheless they believe, and we agree, that, despite the cost to management, industrial feeding is an important factor in the betterment of employee relations". . . . THERE'S a muddled *non sequitur* in the current *Harper's Magazine*. Under an article entitled "Doctors on the Boardwalk," the publishers state that the lay author of the article was the one person best suited to report the recent A.M.A. Meeting at Atlantic City because his latest novel dealt with the life of a surgeon. By the same token, the author of "Lewd Moon" (page 445) becomes an authority on astronomy! Reminds of a recent popular magazine poll of "experts" on socialized medicine. A study of the positions and backgrounds of the so-called "experts" disclosed that only a small minority of them knew what they were talking about. The American people, however, seem to be suckers for the *non-sequitur* that big names mean big knowledge.

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DR. VOLNEY S. CHENEY, Medical Director of Armour and Company since 1920, is retiring early in October. He will be succeeded by DR. JOSEPH A. HUBATA, who, for nine years was Medical Director at International Harvester's West Pullman Works, and has lately been Assistant Medical Director at Armour's. DR. CHENEY is withdrawing from all medical activities; his headquarters will be at Las Vegas, New Mexico.

DR. ROBERT M. GRAHAM, Director of Sanitation and Surgery of the Pullman Company, and President of the CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY, is Vice-Chairman of the Medical and Surgical Section of the Association of American Railroads, succeeding DR. K. E. DOWD, who was elected Chairman following the resignation from that position of DR. G. P. MYERS, Medical Director, New York Central System. DR. MYERS resigned because of his retirement from active railroad service.

Institute of Industrial Medicine

DR. ROBERT A. KEHOE, Director of the Kettering Laboratory of Applied Physiology, University of Cincinnati, announces detailed plans for the newest University of Cincinnati instructional unit, an INSTITUTE OF INDUSTRIAL HEALTH, to become the center for a highly specialized program of graduate study and training in the field of industrial medicine. This is believed to be the first such program to offer intensive courses leading to the new degree of DOCTOR OF INDUSTRIAL MEDICINE. Applicants for admission will be screened to meet unusually high requirements for entrance and those accepted will be limited in number. The institute is under the Graduate School of Arts and Sciences. The university's Kettering Laboratory of Applied Physiology is the institute's central unit. Cooperating will be faculty members of the university's Colleges of Medicine, Law, Business Administration, and Engineering. In addition, a group of physicians in industrial organizations will assist and make available their medical facilities. "On this background, a two-year course of graduate training has been outlined," DR. KEHOE states. "The formal prerequisite for admission is graduation from a class A medical school plus at least two years of training in a hospital accredited by the American Medical Association for training resi-

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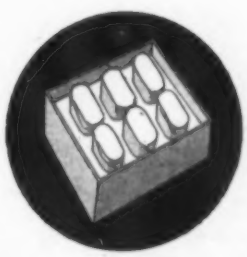

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dent physicians. A third year of practical experience in industry is advisable. So great is the need for post-graduate training dealing in a professional manner with the manifold hygienic problems of a highly industrialized society that it becomes a duty on the part of a modern medical center to meet this need to the extent of its ability." Plans are under way with a number of industries to give further aid to the institute's program by financing fellowship grants for its students. Pioneering as its first students are DR. ARTHUR M. EDWARDS, Orlando, Florida, 1939 graduate of the Louisiana State University School of Medicine, New Orleans, and DR. IAN MACLACHLAN, Toronto, Canada, 1938 medical graduate of the University of Toronto. The Kettering Laboratory was founded by gifts from American industry to attack the fast-growing hazards to life and health presented by new chemical and manufacturing processes. It has won a wide reputation in this field. During the war its staff carried out numerous investigations of top-drawer-secret calibre for government agencies. DR. KEHOE, who is a Cincinnati university graduate, has directed the Laboratory since its work began. The laboratory bears the name of Dr. Charles F. Kettering, eminent automotive and industrial research leader and until recently vice-president of the General Motors Corporation in charge of research, who was largely instrumental in obtaining funds for its building. DR. KEHOE will be Director of the new INSTITUTE OF INDUSTRIAL HEALTH.

GENERAL

Two Antigo manufacturing plants now provide industrial nurse service for their employees. They are the Vulcan Corporation and the Albert H. Weinbrenner Company. MISS MARIAN BUNTEN is industrial nurse for the Vulcan Corporation and has her office in the former company office at the Edison Street plant. Employees come there for treatment of any injuries they may receive and for such further check-ups and dressings she may recommend. The Weinbrenner Company has an industrial nurse quartered at its Merrill plant who visits the Antigo plant once a week. The Weinbrenner Company's nurse is MISS MARIAN WRIT.

—*Antigo (Wisconsin) Journal*, July 23, 1947.

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malarial control measures. The Middle American Republics are continuously working on their public health problems. El Salvador has a special situation because of its concentration of population. With more than 1,800,000 inhabitants in an area of some 13,000 square miles, it is the most densely populated country in Middle America. But this small country has 23 independent hospitals with a total of 2,600 beds.

—*New York Enquirer*, August 4, 1947.

Survey in Vermont

A STATE-WIDE industrial hygiene survey of Vermont's industries is now being conducted by the Division of Industrial Hygiene, Vermont Department of Public Health, in accordance with the provisions of Joint Resolution No. 299, relating to a study of occupational disease hazards in the state passed by the legislature at its last session, and signed by Gov. Ernest W. Gibson. The preliminary survey is now being directed by HARRY B. ASHE, Industrial Hygiene Engineer, on the staff of the Division of Industrial Hygiene of the Department of Public Health.

—*Saint Johnsbury Caledonian-Record*, July 12, 1947.

Sauce for the Goose

IN connection with the negotiations of the United Automobile Workers Union with General Motors, Mr. Luckman said that the union officials sought greater welfare adjustments from General Motors, but at the same time the union makes no provision at all for sickness, accident, and disability insurance covering its own employees.

—Lever Brothers President, CHARLES LUCKMAN, quoted in *New York Engineer*, July 21, 1947.

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COMMENT and OPINION

INDUSTRIAL medicine is so interwoven with industrial relations that inadequate or discourteous medical service can spoil the pattern and ruin the texture of the valuable fabric of employer-employee understanding.

—*Buffalo, N. Y., News*, May 2, 1947.

NORTHWEST MEDICINE "warns physicians against entering into agreement to service employees enrolled in private hospital associations in a single industry, citing the example of the Telephone Employees' Hospital Association of Oregon, Inc. Indicating that plans of this kind are posing a rising threat, a careful analysis is given of the pitfalls such arrangements entail. The end result is that "those gullible doctors who swallowed the bait are in a one-way deal, selling both themselves and their colleagues down the river of cut-rate medicine to ultimate disaster."

—*J. Indiana State M.A.*, August, 1947.

FOR THE record I would say, that in my humble opinion, in or out of uniform, General Clay is one of the top-flight men of our country. Of course, he suffers from the occupational disease of the trained soldier. He believes in obeying orders.

—From an address, "Germany Revisited," by JAMES S. KNOWLSON, President and Chairman of the Board, Stewart-Warner Corporation, August 20, 1947.

SALT tablets a "must" to beat the heat at U. S. Steel Corporation and other industrial plants. Know the origin of the practice? For years many European steel mills served beer and pretzels to workmen during the dog days. About 15 years ago learned that what kept Joe Steelworker's motor running efficiently was not the amber fluid but the salt on the pretzels! And so a delightful custom was salted away.

—From "The Town Crier," by NORINE FOLEY, in *Chicago Daily News*, August 7, 1947.

NOTHING is going to be done about either bill this year. The current excitement is merely a warm-up for 1948, when the glorious spectacle of playing politics with public health will be unveiled before the voters.

—PETER EDSON "U. S. Care for Sick," in *Chicago Daily News*, July 17, 1947.

Hygiology

AN ILLUSTRATION of the advancement of health in industry is the expanding activities of Industrial Hygiene Foundation and its hygiology, a fusion of the sciences concerned with the well-being of people at work.

—*Chem. & Engr. News*, May 5, 1947.

Editorial Note

DO ALL pages of a magazine have equal value for advertising? Probably yes. Stanford University Psychologist L. W. Ferguson found by technical analysis of one of America's foremost weeklies, that one page is just as valuable as another.

—From "Let's Explore Your Mind," by ALBERT EDWARD WIGGAM, D.Sc., in *Chicago Daily News*, August 20, 1947.

Good Idea

REPRESENTATIVE HARNESS, chairman of the House Subcommittee on Publicity and Propaganda, has requested Attorney General Tom C. Clark to prosecute Isidore S. Falk, director of the Bureau of Research and Statistics of the Social Security Administration, for breaking the Federal law against lobbying. House Report No. 786 brings out the fact that Federal funds have been used for the purpose of influencing legislation before Congress. The report deals "exclusively with activities calculated to build up an artificial, Federally stimulated public demand upon Congress for enactment of legislation for compulsory health insurance referred to by witnesses and publications as the Wagner-Murray-Dingell bill."

—*Connecticut State Medical Journal*, August, 1947.

Renal Injury

THE generally accepted but erroneous belief that acute carbon tetrachloride poisoning is usually associated with severe liver injury may lead to failure to establish a correct diagnosis in cases of carbon tetrachloride poisoning resulting from inhalation of its vapors. A case of severe renal injury without clinical evidence of liver injury following brief but intense exposure to carbon tetrachloride vapor is presented in detail. The clinical picture in this case was dominated by ano-

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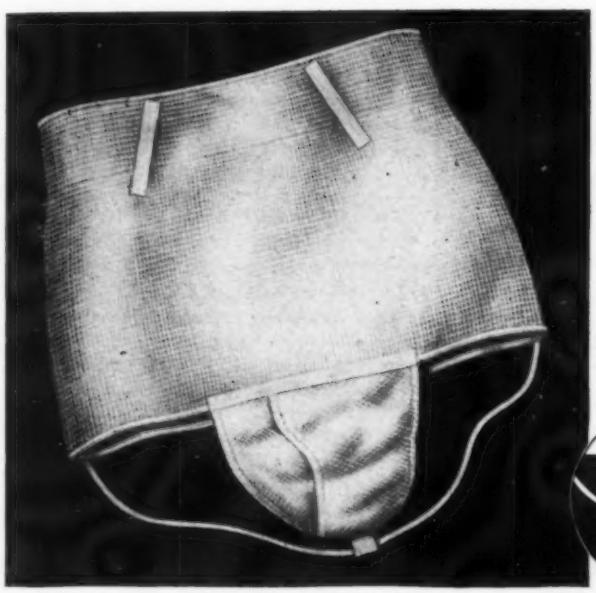

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rexia, lethargy, hypertension, azotemia and urinary findings suggestive of nephritis. Complete recovery, with a return of the blood pressure to normal, and disappearance of evidences of renal disease took place under constructive therapy. The possibility that this syndrome occurs frequently following the inhalation of carbon tetrachloride is emphasized.

—Summary, from "Renal Injury Following Exposure to Carbon Tetrachloride," by MARSHALL CLINTON, JR., M.D., in *New England Journal of Medicine*, August 7, 1947.

Pent-up Fury

HAS the psychoanalyst an "occupational hazard?" Yes, says DR. J. CLARK MOLONEY in "Diseases of the Nervous System." He is called upon to face not only the ridicule and misunderstanding of a large part of the public, but outright abuse and insults from his patients at some phases of their treatment. Yet while ordinary men and women are free to get angry under provocation, the analyst is committed to passivity and silence. If he has no nonprofessional interests and pleasures, he may well develop cardiovascular disorders based on pent-up fury.

—From "Mirror of Your Mind," by LAWRENCE GOULD, Consulting Psychologist, in *Chicago Herald-American*, August 16, 1947.

The Manly Art

JIMMY CANNON has listed a few of the souvenirs other fighters have taken with them into retirement: deafness, blindness, even insanity. It's strange how short a time it takes, in some cases, to transform a handsome young man with the sparkle of youth and self-assurance in his eyes into a drooling, thick-voiced clown with a face like a gargoyle. . . . Don't misunderstand us. We're not advocating out-lawing prize-fighting, although some day it's possible people will decide to stay away from the professional ringside. We are suggesting that the State Athletic Commission, which has been pretty active lately worrying about crooked gambling, spend a little more time worrying about the fighters. They might begin by looking into the possibility of making handlers responsible for any preventable injuries sustained by their fighters through neglect, by firing Commission doctors when they guess wrong about a fighter's condition, by studying whether managers and promoters should be limited as to the amount of their take. And maybe the promoters, managers, seconds and others who make a living out of the noble art might get together to set up a fund for fighters who pick up some of the occupational diseases of the industry.

—*New York Post*, July 26, 1947.

"In Terms of Human Salvation"

ANY sensible individual in industry today must acknowledge the tremendous value of industrial medicine," HENRY R. MALLORY, executive vice-president and director of Cheney Brothers, Inc., told members of the Connecticut State Medical Society's Committee on Industrial Health at a meeting in the Hartford Club, Wednesday evening, May 28. While industrial management has no adequate method of measuring the true value of industrial medicine, he declared that its results "in terms of human salvation" are obvious to modern management. There has been a tremendous revolution during the twentieth century in the whole outlook and approach of management in industry," he told the committee, and prophesied continued progress in the field of industrial human relations. The meeting followed a dinner given by the management of Cheney Brothers, and was the concluding event of a program which started with a tour of the company's Manchester plant early in the afternoon. During the tour members of the committee inspected the plant hospital, observed the weaving and production of the testing tower where parachutes made by the company for the military services are tested prior to shipment. ROBERT P. KNAPP, M.D., physician for the company, and a member of the committee, discussed medical problems of the textile industry following the talk by MR. MALLORY. The industry has no unusual hazards, he said, and explained that the main effort of his medical department is directed toward the maintenance of good employee health through the practice of preventive medicine. The program is accomplished through pre-employment and periodic health examinations, routine

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—*Connecticut State Medical Journal*, July, 1947.

Health and Welfare Clauses

EMPLOYEE health and welfare clauses were contained in only 45 (or 15%) of 300 union contracts which have just been analyzed by the National Industrial Conference Board. In four out of five, the employer paid the entire cost of these benefits. In slightly over half (25 of 45), details of the program of benefits had been incorporated in the contract. In seven the agreement provided that the existing scale of benefits should continue unchanged; in four, the company promised to liberalize its current plan. The insurance program was accepted in principle under seven agreements, but the details were to be worked out later by the employer and the union. In two cases, the employer indicated that he would investigate the plan proposed by the union. As to administration of the funds, 41 plans specified that benefits be underwritten by insurance companies. Only two provided that the fund should be administered by the union, the remaining two for joint management-labor control. Comprehensive benefits were provided under the 25 agreements which gave full details. Most included life insurance, accidental death and dismemberment benefits, non-occupational accident and sickness benefits, and hospital and surgical benefits for employees. A small proportion also provided hospital and surgical benefits for workers' dependents.

Tends to Degrade

IT CAN be said that health insurance tends in general to degrade the quality of medical service provided. Specifically the principal medical problems of health insurance are: (1) restrictions on treatment; (2) restrictions on prescribing therapeutic agents of every sort and variety; (3) restrictions on the free choice of physicians; (4) infringement on professional secrecy; (5) the crushing burden of records and entangling red tape; (6) the exaction of excessive attention by some portion of the insured; (7) the rendering of superficial and hasty treatment by some portion of the medical profession; (8) the weakening of incentive by a limiting definition of obligations, and by limitation on rewards. The medical problems of health insurance stem generally from the coupling of a method of spreading the risks of service costs with the delivery of that service. Superficially regarded, this coupling not only appears to be proper but even good and rather ingenious. It seems to speak an uncommon good sense, namely, "let's all pool our resources and then we will be able to afford the best." Upon critical scrutiny, it becomes clear that the coupling is founded on several rather serious misconceptions. The first is that the lack of money resources is the major and widest cause for inadequate medical service; the second is that the insurance principle applied to large numbers will provide the now lacking resources. The third is that, having sufficient money resources, it will be possible in short order not only to obtain, but to make effectively operative more and better medical service. While money does affect the availableness of medical services, it is far from a major determinant. There is no direct correlation between communal income and medical service.

—From "Medical Problems of Health Insurance," by IAGO GALDSTON, in a publication of National Industrial Conference Board.

Five New State Laws

INDUSTRIAL Hygiene Foundation's Legal Committee analysis of the five new state occupational disease compensation laws enacted at the 1947 sessions of the legislatures. This also summarizes the amendment to the New York occupational disease law and reports the appointment of legislative commissions to study proposed occupational disease legislation for Vermont and Montana. The states which have enacted new laws

are: Iowa, Nevada, Texas, Tennessee, South Dakota. The Nevada and South Dakota statutes and the New York amendment became effective July 1. The Tennessee law became effective March 12; the Iowa statute goes into force on October 1. The Texas act becomes effective 90 days after the adjournment of the legislature. The two legislative commissions have already started their work. The Vermont commission will investigate working conditions in industrial plants and will study the need for providing compensation. This commission is scheduled to present its recommendations by December 15, while the report of the Montana Commission is to be presented to the 1949 session of the assembly. The new laws give lengthy lists of compensable diseases, and make special provisions for compensation resulting from silicosis, with limitations on monetary liability and on the time for disablement or death. Longest category on compensable diseases among the new laws is contained in the Texas legislation, which includes poisoning by beryllium, the etiology and pathology of which was discussed in a paper, by the late DR. L. U. GARDNER, of the Saranac Laboratories, posthumously presented at the annual meeting of the Industrial Hygiene Foundation at Mellon Institute last fall.

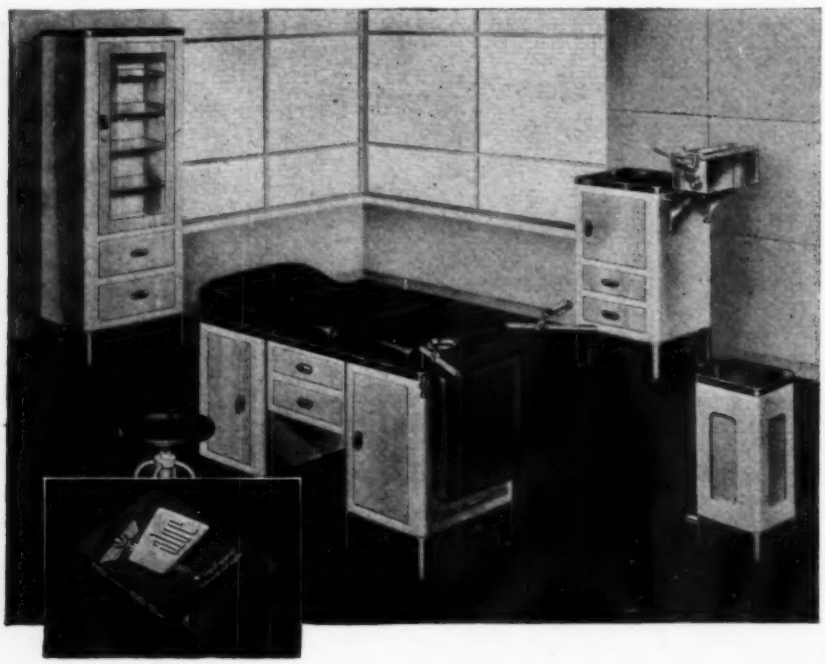
Eyes

"THE Nurse in an Industrial Vision Program," RICHARD FEINBERG, B.S., D.O.S, *American Journal of Optometry* and *Archives of American Academy of Optometry*, September, 1946: The author points out that the industrial nurse should be concerned with the vision of employees since she and the safety engineer often are the team responsible for industrial safety and welfare, which are dependent on good vision. The article includes the following outline of essential factors in a successful eye program: (1) Testing employees' visual skills. (2) Proper analysis of specific job visual demands. (3) Establishment of correlations between visual skills and job demands. These must be established separately for each organization. (4) Placement of applicants into jobs for which they are qualified visually as well as physically. (5) Testing employees already on the job using standards established on item (3) above. (6) Periodic re-checks of special employee groups: (a) presbyopes, (b) employees in jobs having special visual demands (e.g., very close work), (c) those already identified as being visually handicapped. (7) Prompt referral of employees with pathological eye conditions. (8) Referral of employees requiring refractions and prescription of corrective-protective glasses. (9) Provision of safety glasses and goggles as well as professional fitting and subsequent servicing of such devices. (10) Correct lighting through scientific planning. (11) Adequate facilities for first aid to the eye. (12) Periodic check of environmental conditions.

—*The Sight-saving Review*, 17:1, 61, Spring, 1947.

University of Louisville

DR. ERNEST W. BROWN, who is conducting a survey of industrial medicine courses in the more than 75 medical schools in the U. S. and Canada for the American Medical Association, found reason to award high praise to the program of the University of Louisville Medical School. Following a conference with JOHN WALKER MOORE, dean of the U. L. school, and WILLIAM W. STALKER, industrial hygiene chief for the State Board of Health who delivers the industrial medicine lectures, he declared the U. of L. is already "outstanding in the field." The required course, offered for the first time last year, is taken by all medical school students in their Junior year as a part of their study in DR. JOHN J. PHAIR'S department of preventive medicine. In the 28 schools he has already visited, occupational health receives an emphasis ranging from "nothing to a well-developed course which is a standard part of the curriculum," DR. BROWN said. The war gave a "major impetus" to the field, and now the A. M. A. is considering making industrial medicine a specialty, like obstetrics or psychiatry. Formal A. M. A. approval is prerequisite to recognition of a new specialty. Dr. Brown pointed out that most plants employing under 500 workers have no medical supervision whatsoever—and such small enterprizes comprise 80% of the nation's industry. Pre-employment and later



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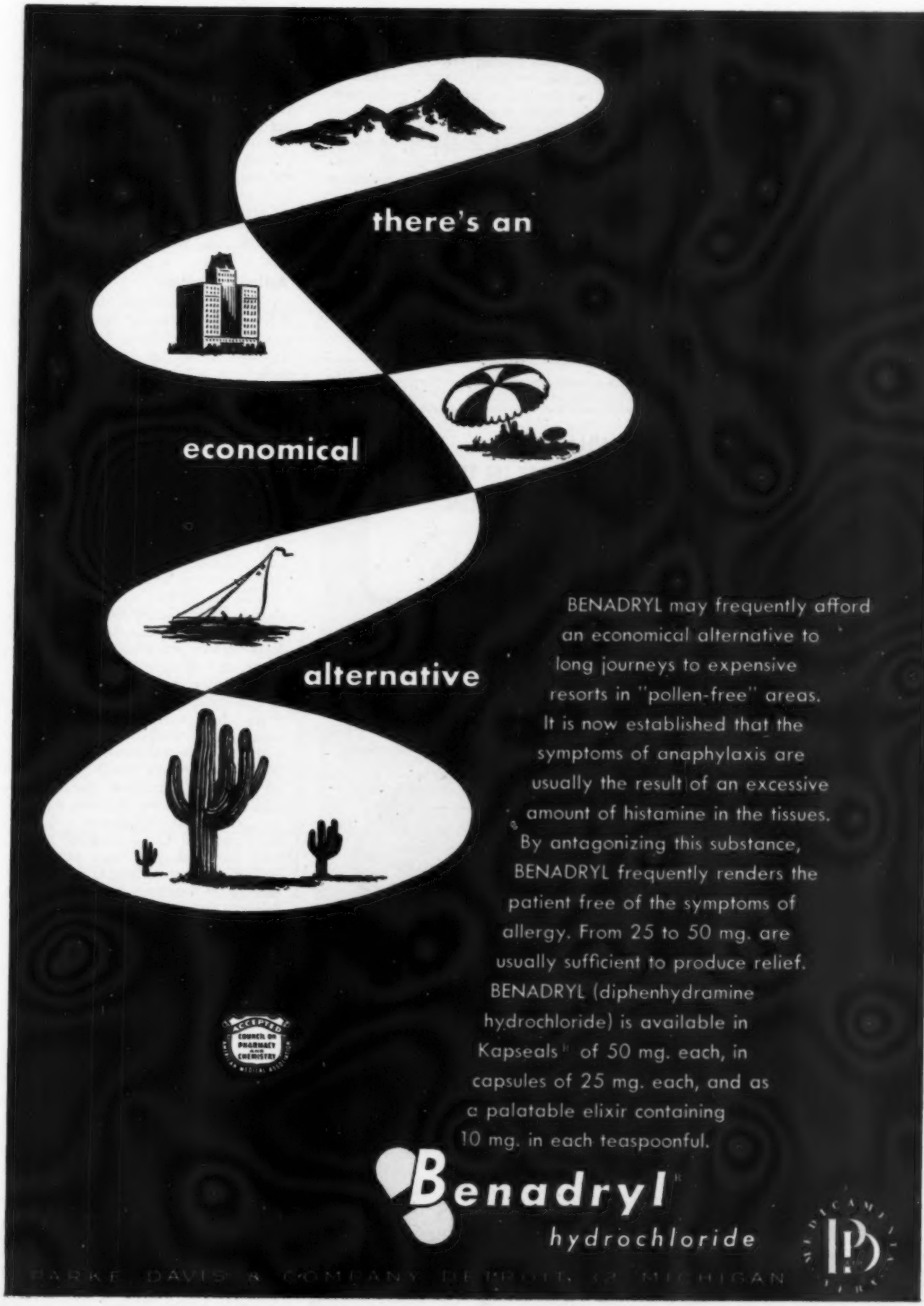
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periodic examination and protection against health hazards such as poisonous substances produced in industrial processes are examples of the services possible in an era of industrial medicine specialists.

—*Louisville, Kentucky, Times*, July 30, 1947.

"The Lies I Tell. . . ."

MEMBERS of Britain's medical profession take just as dim a view of socialized medicine, it appears, as do their counterparts in America. In fact, physicians here seem to be glad that a fight looms on the proposed nationalization of Britain's iron and steel industry, because "it means maybe they won't get around to socializing medicine quite so soon." The British medical journal is currently concentrating on condemning the effect of the state machine on the individual. "Renewed threats to stability of the state," says the current issue, "are met by increasing legislation of a restrictive character. Hemmed in by statute, order and regulation, the individual has little choice to order his own way of life and often enough succumbs to the twin evils of apathy and frustration. Since the end of the war, politicians have shown a growing reluctance to trust the individual, who, in the present vast and imposing machine of the state, is made to feel little more than a cog. He becomes a 'calorie-consuming unit: a man-hour producing mechanism.'" Meanwhile, individual members of the medical profession are not entirely averse to helping along by a bit of lying for patients beset by this rigid state control over their private lives. For example, a woman in England today is unable to buy that completely essential garment, the girdle without a doctor's order. The elastic necessary in constructing a girdle is one of the items in short supply in this land of austerity. So the women goes to her doctor and gets the necessary certificate for health's sake or, in medical language, for the purpose of correcting "a weakened sacro-iliac." One physician, who has his share of the fancy carriage trade, shook his head wistfully and remarked to me, when I brought up the subject: "The lies I tell these days. But I have to do it. If I refused my women patients would go elsewhere where they would be obliged."

—WILLIAM MCGAFFIN, in *Chicago Daily News*, August 20, 1947.

Attlee's Disease

A BRITISH physician, DR. RUSSELL FRASER, says that the method of governing his country these days is driving a lot of his countrymen nutty. In a paper published by the *British Medical Journal*, the doctor says that a third of the workmen who give illness as their excuse for staying away from their jobs are physically sound; all that's wrong with them is a neurosis. The ailment ought to go down in the medical books as Attlee's disease. DR. FRASER'S account of its etiology is worth quoting: "Hemmed in by statutes, orders and regulations, the individual has little choice to arrange his own way of life and often succumbs to the twin evils of apathy and frustration. Since the end of the war, politicians have shown growing reluctance to trust the individual who, in the present vast and imposing machine of the state, is made to feel like little more than a cog. He becomes a calory consuming unit, a man hour producing mechanism." It seems unlikely that Adam Smith ever heard of a neurosis by that name but he had a tail hold on the idea when he remarked that "whenever commerce is introduced into a country, probity and punctuality always accompany it." He was thinking, of course, primarily of meeting debts when due, but the principle is capable of much wider application. When government undertakes to run people's lives for them, as if they were irresponsible children, it will encourage large numbers of them to cease behaving like responsible adults. . . . There is a black market in England, too, and when it becomes notorious, hopes for Britain will arise. Governments make black markets by printing too much money and then trying to obviate the consequence of inflation by fixing prices at an artificially low level and rationing consumers. People who have things to sell are told that they must sell them for less than other people are willing and able to pay. A relatively law abiding people like the British take this kind of thing lying down, with the result that industry and commerce stagnate. Workmen who have more money than they can now

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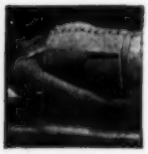

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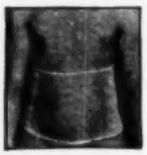

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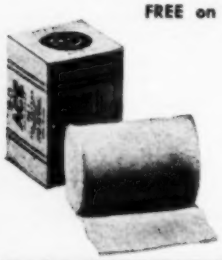

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spend have no incentive to work harder. Business men, knowing that their profits will be taken from them in taxes, are similarly frustrated. In the end, not only the economy of the country but the morale of its citizens degenerates. On second thought, the suggestion that the neurosis DR. FRASER has described should be called Attlee's disease is withdrawn. The name will do well enough in England but the disease is world-wide. In America we would call it Roosevelt's disease; in France, they would call it Blum's; in Russia, Lenin's. Fortunately, the treatment is known. All that is required is the repeal of the "statutes, orders and regulations" to which DR. FRASER referred. A lot is wrong with the world, but many of its worst ills would be cured in a few years by a restoration of a free economy.

—Editorial, *Chicago Daily Tribune*, August 18, 1947.

Bureaucratic

IN A COLUMN written some time ago on the subject of socialized medicine, Dorothy Thompson said: "Cooperative medical schemes are voluntary efficient, cheap of administration and cheap for the participants, and could be standardized on a high level. State schemes are bureaucratic, heartless and open to dangerous collusion between assembly-line physicians and patients at the public cost—as those who have lived under them. . . . Barnum said a sucker is born every minute. Along with the sucker is born a politician, and nowadays, a 'progressive' to beat his drums for every measure that extends the power of the state, even into the most intimate parts of life." Socialized medicine could produce no good result that cannot be produced more efficiently and cheaply, and without danger to our liberties, by pre-paid medical care of the kind offered by the voluntary plans now in effect practically everywhere in this country. What socialized medicine would do is to make the doctor a tool of the politician, thus turning medical treatment and progress into a political matter, and force us all to take whatever kind of medical service the politicians wished to give us and to pay for it with an involuntary tax. It has been said that pre-paid, voluntary medical plans will not solve the problem of the completely indigent. But that problems affects a very small proportion of the people, and should be solved without creating another Federal bureaucratic monopoly. Socialized medicine would simply be one more long step toward the completely totalitarian state.

—*Mobile Post*, July 4, 1947.

Occupational Diseases

IT IS somewhat surprising to learn that the South outranks the West industrially and that there are now more industrial than agricultural workers in our area. For this reason, therefore, we are constrained to give increasingly more attention to the diseases that are of occupational origin. The U. S. Department of Labor has listed 10 major hazards of employment. These are: (1) abnormalities of air pressure; (2) abnormalities of temperature; (3) dampness; (4) defective illumination; (5) dust; (6) infection; (7) radiant energy; (8) repeated motion; pressure or shock; (9) poisons; (10) dermatoses. Grey has listed three postulates which must be proved to establish a diagnosis of occupational disease, namely, exposure to a known harmful substance; the presence of clinical symptoms and objective findings resulting from contact with a specific harmful substance; and finally, confirmation by established laboratory criteria. It was in 1911 that effective labor legislation began in the United States. It was in that year that New York and California made the reporting of occupational diseases compulsory and New Jersey made certain occupational diseases compensable. Now all the states except one have laws requiring compensation for at least some of the industrial diseases. In addition to Federal and state legislation requiring employers to pay for accidents and occupational diseases, impetus has been given by a number of voluntary organizations and scientific and professional associations. In the forefront of these latter have been the National Safety Council, the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION. The American College of Surgeons organized its Committee on Industrial Medicine and Traumatic Surgery in 1926. This committee has done excellent work in setting minimum standards for

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medical services in industry, in surveying the medical departments of industrial plants and accrediting those that measure up to their standards. The Council on Industrial Health formed by the American Medical Association has had a strong influence on the continued development in industrial medicine through its Annual Congress on Industrial Health, through its exhibits, and by influencing the state and local medical societies to appoint committees and help them develop programs on industrial medicine and health. Post-graduate and undergraduate industrial medical education are also being given increasing importance by the Council on Industrial Health.

—Editorial, in *New Orleans Medical and Surgical Journal*, August, 1947.

Talking It Over

THE primary principle in mental hygiene work is that a person is helped by talking over his problems with a respectful, relatively objective and non-judging second person. Those words "a person is helped" again present a problem of definition. Let us grant for the moment that the measurement of human productiveness is a means of judging whether or not a person has been "helped." In the Hawthorne plant of the Western Electric Company, an experiment in industrial hygiene was designed to show the effect of changing working conditions on the productiveness of workers. Rest periods, lunches, lighting — all were varied and compared with a control group. The result of this work is widely known; a factor of competition came into play and proved to be a great deal more important than any change of working conditions. Further study showed that some individuals showed wide swings in productiveness, sometimes making high records and again hitting slumps of low output. Investigation showed that the mental ease of the worker was the determining factor in many instances. When things were running on an emotionally even kee', output was good; when there was a fight or sickness or other strain at home, output was poor. It was found that talking a problem over with a counsellor resulted in an increase in productivity, even if no other action was taken to relieve the tense situation. Furthermore, and this is important to public health, it was found that the increased productiveness offset the cost of the personnel hired to do the counselling. What this means is simply that talking the situation over with a relatively objective, respectful second person brought increased mental health as shown by increased production. Almost all industries which, under the duress of the war, introduced counselling systems for their employees found them of value; the techniques appear to work even in the hands of relatively badly trained and not too well selected counsellors.

—From "Mental Hygiene in Public Health," by PAUL V. LEMKAU, M.D., in *Public Health Reports*, 62:32, 1151-1162, August 8, 1947.

Joint Plan for Small Plants

THE HEALTH Committee of the Garfield Chamber of Commerce, headed by DR. EMIL DUL, City Physician, suggests that small industrial plants in the community consider a joint industrial health plan. "Large industries in general have industrial health services," said DR. DUL, "but few small plants provide health protection and services for their employees. The Health Advisory Council of the U. S. Chamber of Commerce has called attention to a recent statement by the U. S. Public Health Service, that the biggest industrial hygiene problem today is in the smaller plants, which make up 98% of all industrial establishments in the country and employ 60% of all industrial workers. It has already been demonstrated in some communities that employers, labor unions, state and local health departments, and local medical societies, can cooperate to provide for small plants' industrial hygiene services. Provisions of one cooperative plan covering several small plants, which has already been successfully worked out, include: (1) Services of an especially trained public health nurse. (2) Industrial hygiene service for the detection, control and prevention of occupational health and accident hazards. (3) Diagnostic assistance and facilities, among them chest x-ray to discover tuberculosis and

Case X—Massachusetts General Hospital Patient—Victim of Cocoanut Grove Fire.

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*Ann. of Surg. 117:885 (June) 1943.

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heart conditions, and sero-diagnosis to find V. D. (4) Assistance to plant physician by a specialist in industrial disease, to aid in diagnosis of occupational illnesses and in medical problems arising in the plant. (5) Industrial health education materials. (6) Plant medical departments fully equipped to fit each plant's needs. (7) The service of a physician, on an hourly basis sufficient to give adequate service to all employees. (8) Environmental health controls, as recommended by industrial hygiene enigneers.. (9) Examination of workers at the time of employment, periodic examination if necessary, and examination upon return to work after illness. (10) Treatment of occupational illness and medical emergencies. (11) Referral to private physician or hospital for necessary treatment."

—*Garfield, New Jersey, Guardian*, August 1, 1947.

New Protective Cream

A COMPOSITE CREAM, or ointment, which protects the skin against extremes of heat and cold, especially in industrial occupations was one of 416 inventions on which patents were granted this week by the U. S. Patent Office, 83 more than last week's total. Designed originally to prevent flash burns from explosions aboard ships and in other confined spaces, such as armored tanks and gun turrets, this cream, patented (No. 2,423,311) by GORDON BROWN FAULEY, United States Navy, and ANDREW CONWAY IVY, of Chicago, is said to provide a degree of protection afforded by none other known for this purpose. "The value of this preparation," it is stated, "has been abundantly proved by actual tests, and, further, has proved its utility in battle. In the experimental tests, a cannon was constructed capable of throwing a heat wave having a temperature of 1,500°C at a distance of 24 centimeters from the cannon's mouth. This heat was sufficient to burn ordinary clothing and when allowed to act on the unprotected skin caused second degree burns. A single application of the protective film served to afford complete protection for more than two hours under all environmental conditions, including those as a result of which large amounts of perspiration were generated during the test." The most important ingredient in the anti-burn mixture is titanium oxide, found preferable, it is said, to aluminum or zinc oxide. The preferable solvent is isopropanol, "which normally evaporates in less than five minutes after application of the ointment with the resulting production of a hard but flexible film," the film-forming material being shellac. Also included are a lubricant, such as magnesium stearate, and, in diminishing quantities, linseed oil, borax and other "component agencies." This "tough, workable cream," it is asserted, "makes a smooth, even coating which does not rub off, is non-toxic, non-allergic, and non-irritating to the human skin and may be removed by soap and water."

—*New York Times*, August 16, 1947.

The Soviet Method

THE Wagner-Murray-Dingell-Pepper Bill (S. 1320) is the most adroit and dangerous approach to compulsory sickness insurance that has ever been made in the United States. It is the result of 10 years of intrigue, planning, polishing and adjustment. Clauses in the bill seek to delude members of the professions by claiming to maintain the confidential nature of reports, and the sacred nature of the doctor-patient relationship. A move has been made toward what is called decentralization. Largely these are meaningless gestures, and window dressing. The basic issue remains. This is compulsory sickness insurance. Upwards of $5,000,000,000 would be channeled into an agency of the Federal government to purchase the services and allegiances of physicians, dentists, nurses and operators of health institutions. This is the Collectivist—the Soviet method. Our American way of life, our American institutions cannot survive the operation of an administrative mechanism of such a nature and scope. Under its operation, the independent status of the professions would be sacrificed. Members of the professions would

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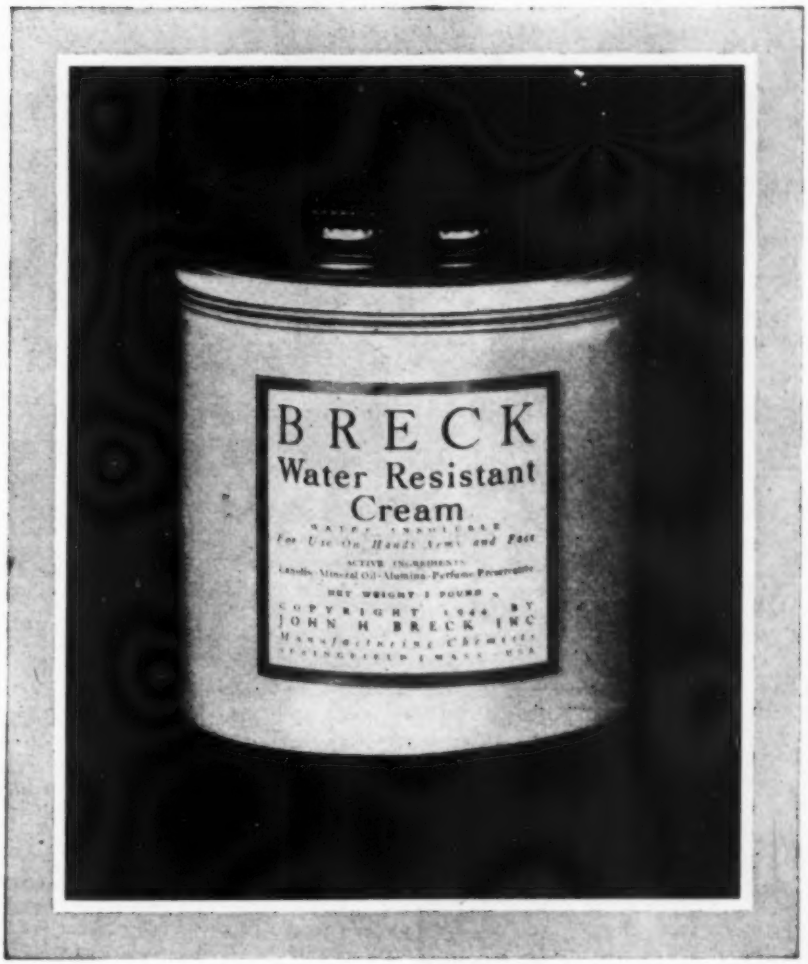

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become servants, taking orders from the lay bureaucrats.

—From *Jackson County Medical Society Weekly Bulletin*, June 14, 1947.

In-Plant Feeding

THE business of serving meals to employees is a losing one for most company cafeterias and lunchrooms. Although industrial feeding programs are not intended to make a profit they are designed to provide food for employees at cost. However, only a few companies succeed in operating their restaurants on a break even basis. The majority of the estimated 20,000 industrial restaurants operated today cost companies varying amounts ranging as high as $200,000 to $300,000 annually, said Armin Kusswurm, attorney for the National Restaurant association. "Nearly all companies are losing money on these operations," said Kusswurm. "Nevertheless, they believe and we agree that despite the cost to management industrial feeding is an important factor in the betterment of employee relations." Many companies are satisfied if they can break even on direct charges for the cost of foodstuffs, materials and equipment, and labor. How much more the restaurant costs them for numerous indirect charges such as rent, light, and heat, depends to some extent on accounting practices, specialists said. Frequently, companies fail to realize the extent of the combined direct and indirect charges for the project. One specialist related that the management of a large company had for some time charged off $1,200 monthly which it believed was the cost of operating the company cafeteria. A skeptical restaurant manager finally made a survey of the costs which disclosed they were actually closer to $7,000 a month. Most companies realize they are not breaking even on the costs but are undecided what to do about it. The manager of a cafeteria for a large food processing company said the average price of meals now is 35 cents but should be 55 cents if the company is to break even. He said he is in a dilemma trying to decide whether to raise the price of meals or reduce the quality and variety of menus, neither of which he wishes to do. "The owner of a public restaurant can increase the price of meals to keep pace with rising costs and do it with only a few complaints from customers," Kusswurm explained. "But raise the price of pie one cent in a factory restaurant and a thousand employees make it an issue." The manager of a restaurant that provides 50,000 meals daily for employees of an electrical manufacturer, whose food program is regarded as one of the most successful in reducing costs, said he believes in raising meal prices only as a last resort. Increased food costs should be met where possible by balancing seasonal food items against rising items and by efficient buying, he said. Overall costs of maintaining a company restaurant can best be solved by obtaining efficient restaurant management and personnel experienced in the restaurant business, he asserted. Industrial restaurants are operated either by the company itself or by an industrial feeding contractor. The 20,000 restaurants in operation today are about double the pre-war number. The prices of meals range from 20 to 75 cents, averaging approximately 20 to 30% below the average charged in public restaurants.

—*Chicago Sunday Tribune*, August 24, 1947.

DR. PILGRIM

NOW concerned with analysis of material relating to a former employee of a large corporation, in which it is alleged there were injurious effects from chemical compounds used for the treating and softening of water to avoid boiler corrosion. . . . AND in conference with industrial hygienists on possible injurious effects in the manufacture of fluorescent lighting equipment; and spending much time in review of some public liability cases involving health and property damage in a southern state because of exposure to various types of air contaminants. . . . AND to Sunday supper and converse with the STEPLOCKS, meeting the POWELLS (brother of the famous DICK POWELL),

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Pour-o-vac Seals eliminate the possibility of sterile water contamination caused by intake of bacteria-laden dust . . . avoids contamination by unfiltered air.

They serve a secondary function of providing a dustproof seal for remaining fluid when only the partial contents of a container are used. Of importance, they are interchangeable with all Fenwal 3000, 2000, 1000 and 500 ml. containers.

In permitting contents to be stored for long periods under vacuum . . . periodic testing for sterility without breaking the hermetic seal . . . pouring of contents from a non-drip sterile lip, Pour-o-vac seals eliminate the wasteful, time-consuming and questionably scientific method of sealing with gauze, cotton, paper, string and tape.

ALSO INVESTIGATE—Fenwal Automatic Washing Units, capable of accommodating and thoroughly cleansing 4 containers in 30 seconds.

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MACALASTER BICKNELL COMPANY

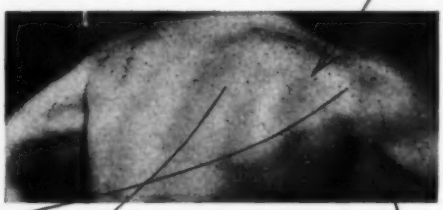
243 Broadway Cambridge, Massachusetts

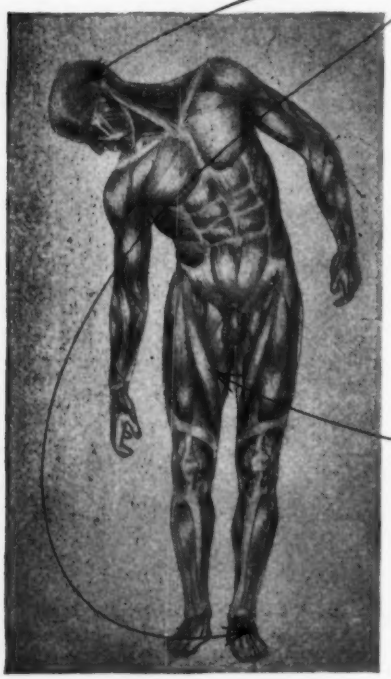
Active

That systemic as well as local therapeutic activity may be achieved with such preparations as Baume Bengué is evident from the fundamental work of Moncorps, Kionka, Hanzlik, Brown and Scott. The unique high salicylate concentration of Baume Bengué, synergistically teamed with menthol affords a bilateral approach to arthritis, myositis, muscle sprains, bursitis and arthralgia.

Locally

at the site of discomfort. Patients appreciate the active therapy and prompt symptomatic relief of a Baume Bengué massage. Topical analgesic effects and a beneficial hyperemia may be readily induced.





Systemically

Baume Bengué likewise makes a positive contribution...
1. systemic absorption of methyl salicylate elicits salicylate analgesia and subjective relief.
2. the prompt relief achieved promotes greater patient cooperation for the execution of specific measures, immediate and long-range, directed against etiologic factors.

Baume Bengué

ANALGÉSIQUE

Baume Bengué provides 19.7% methyl salicylate, 14.4% menthol in a specially prepared lanolin base.

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and later, the KALMES, with much talk of medicine and its present practices. . . . AND with Dr. Enrique Escarrá of Buenos Aires, here to study American methods of industrial medicine and industrial hygiene, with talk of many different matters, and especially whether industrial hygiene units should be in departments of labor or in departments of health. . . . AND enroute to New York on the Century and in conference all next day with industrialists, attorneys, chemists, and engineers on problems of air contamination and public liability in a southern state; and again to Chicago, meeting J. D. BRANDON and his lady, who precipitated a long conversation by speaking nostalgically of Bohemian Club activities in California, to which PILGRIM naturally responded enthusiastically. . . . AND busy at the desk with many galleys and manuscripts, and revisions and corrections thereof, and much disappointment at punctuation and spelling. . . . AND to DR. FRANK and ELIZABETH XAVIERS for afternoon and evening, with MESDAMES PILGRIM, CUMMINGS and WALLACE, with music, food and drink, and later concentration on counting spots. . . . AND to the beach at the club for air and sunshine and a game of shuffleboard, meeting meanwhile DR. HAROLD HOOPER, chief of the Northwestern Railway dental clinic, DR. CHESTER ZEISS, of Carnegie-Illinois Steel, and NORVIN PATTERSON, of the Illinois Central. . . . AND in conference with attorneys, engineers, and manufacturing experts on a public liability damage suit again involving the residents of a nearby community and concerning government restrictions imposed because of various technicalities. . . . AND visiting with DR. M. O. SHOIB, of Cairo, Egypt, here in the United States to study industrial hygiene and industrial medical methods, and conferring on many questions and problems because, as DR. SHOIB uniquely put it, of PILGRIM's "neutral position," and discussing various subjects, including unions, the responsibility of industry and the unions, and the future of industrial hygiene and its teaching. . . . AND sitting with the program committee of the Chicago Section of AMERICAN INDUSTRIAL HYGIENE ASSOCIATION at luncheon, and later with CHARLES WYMAN, WARREN COOK, and HERBERT WALWORTH, and enjoying the visit of THEODORE HATCH, from Industrial Hygiene Foundation of Pittsburgh—he referring to the recent enactment of the occupational disease compensation law in the State of Texas which is called the "A to Z" Texas law, because it has a schedule list beginning with aluminum trioxide (with reference to metals) and ending with zinc. . . . AND listening with interest to the *Reader's Digest* dramatization on the radio and the expert use made of the quotation of Aldous Huxley: "Experience is not what happens to a man—it is what he does with what happens to him". . . . AND again to the softball field, and enjoying contacts with old associates, and later home with FRED HAMMARBORG for supper and evening, meeting the family, OLGA, MARY, JOHNNY, GEORGE and SIG; and interested to play improvised variations on the one-hand themes set by six-year old JOHNNY—wondering that these were in a minor key most of the time. . . . AND again at the desk with dictation and review of meeting proceedings, with all the important information therein expressed; and reading a commencement address of PAUL ("RED") GARRETT (vice-president of General Motors and a fellow alumnus) on "If I Had Your Chance," delivered at the 88th Commencement of Whitman College, June 8, 1947, in which man's freedom and a sound economy basis for man's progress were emphasized—also the principle that competitive enterprise is the key to freedom. . . . AND over the week-end by automobile with RUSSELL and MARIE LINGARD and party to Michigan City, having dinner at the Glass House enroute; and then to Pottawattomie Park to the residence of DR. and MRS. FRANK WARREN and to the Theatre of the Nations at the International Friendship Gardens to see the Zion Passion Players present "Saint Claudia," a sacred drama. . . . AND in conference on several medico-legal problems, one involving the possibility of an etiological relationship of exposure to welding as a cause (so alleged) of glomerular nephritis, and another with respect to the possibility of relationship between cataract and ultra-violet radiation. . . . AND meanwhile arranging for a short sojourn to Kentucky for several days of conferences and inspections, and also with reference to journeys to northern New York State, of which more later. . . .

Remarkable results in dysmenorrhea

In a clinical study extending over a period of a year, Long* used Edrisal as the sole medication in treating 630 employees for dysmenorrhea. Results were dramatic. He concluded, "We use it [Edrisal] with the knowledge that nine out of ten sufferers will get the relief they seek."

Edrisal combines the recognized analgesics—acetylsalicylic acid and phenacetin—with the unique anti-depressant, Benzedrine Sulfate. Consequently, it not only relieves the pain during the menstrual period, but also combats the accompanying psychic depression.

Best results are usually obtained with a dosage of *two* tablets, repeated every three hours, if necessary.

*Long, C.-F., M.D.: Edrisal in the Managemen of Dysmenorrhea, Indust. Med. *15*:679 (Dec.) 1946. Indust. Nurs. *5*:23 (Dec.) 1946.

highly effective in the relief of pain

Edrisal

Smith, Kline & French Laboratories
Philadelphia

THE need for supplementary amounts of vitamins to maintain essential vitamin balance varies in accordance with the patient's dietary restrictions and habits and such contributing factors as pregnancy, wasting diseases, and the anemias. Prophylaxis is assured by optimal quantities of each of the six water and fat-soluble vitamins contained in one Gelseal 'Multicebrin' (Pan-Vitamins, Lilly). Each Gelseal 'Multicebrin' also contains significant amounts of two other important factors, considered to be essential to health, for which optimal requirements have not been definitely established. Two to five Gelseals 'Multicebrin' daily are indicated when multiple vitamins in particularly high potency are desired.

Supplied in packages of 100 and 1,000.

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This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same in the current or any subsequent issues as they may be inclined.

The Journal of Industrial Health, Occupational Medicine and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

Volume 16 | September, 1947 | Number 9

Medical Service in the Shoe Industry in New Hampshire

DAVID W. PARKER, M.D.,
Medical Director, Eastern Division,
International Shoe Company

MEDICAL service in the shoe industry has developed in the last two decades from a practically irreducible minimum to its present status. In fact, this development has been mostly in the last decade. This has come about through a feeling on the part of management that better accident and minor illness coverage might reduce the incidence of lost time from these sources, and would create a more friendly and cooperative relationship between management and the employee. The present medical service, by and large, is still sketchy and incomplete. Very few shoe plants have regular visits from a supervising doctor at the factory, and practically none has universal pre-employment or follow-up physical examinations. Most of the firms of any size now employ full-time nurses, and these nurses are doing a good job as far as their facilities will allow.

Development of full medical service has been slow because it is expensive, and, in an industry where competition is as sharp as in the shoe industry, management must necessarily be shown that the expense of the added service will be absorbed in a better evaluation of the physical condition of employees, higher morale, more intelligent placement on jobs which are adaptable to the individual, and a consequent higher production, and better quality of the product.

At the International Shoe Company, we are fortunate in having a management which is highly progressive and fully cooperative in anything that might add to the efficiency of the service. Consequently, we have been able to develop a medical service which we believe is quite complete, and which functions to the satisfaction of all departments of the company.

The primary object of a medical service is to keep the most employees physically fit, happy, and on the job the most of the time, and, unless it is accomplishing this object, it is falling short in some of its functions.

The basic attributes of a good medical set-up are:

1. Close supervision by a doctor or doctors who are interested in public health problems as applied in industry, and have a working knowledge of safety engineering, plant sanitation, and the mechanical processes in shoe production.

2. Full-time nursing service by registered nurses in the proportion of one nurse to 500 to 600 employees. These nurses should have been fully trained in the problems of industrial nursing, as well as being executive and alert. They must be diplomatic and discreet, and have a personality which is pleasing, and inspires confidence on the part of employees. The importance of adequate training and experience cannot be overestimated. Industrial nursing is a highly specialized and developed field, and problems and situations are constantly arising which are peculiar to this field, and not met with in any other branch of nursing.

3. A physical plant or infirmary with sufficient floor space, and so arranged and equipped that any type of work not requiring general anesthesia or hospitalization can be handled promptly and with safety.

4. A very close cooperation between the medical department and all inter-related departments, principally personnel and employment, and safety and claims. Prospective employees are first interviewed by personnel and employment, then sent to the medical department for examination. Personnel, during this interview, is able to evaluate the personality of the individual, and note, perhaps, evidence of nervous or mental instability, maladjustment, or other deviations from the normal. These impressions are given to our department, as advance information, and are of considerable value in our final rating. Also, after examination, our complete evaluation is discussed with the head of personnel, relative to job placement. This cooperation has proved to be very satisfactory and valuable.

Cooperation with safety and claims has also proved to be of definite value in cases of injury where the causal factor in the mind of the injured employee was a defective machine, or shop condition. These employees practically always report directly to our hospital for treatment, and from the history given to us, we are able to report promptly to the safety and claims department. This gives them the opportunity for immediate, complete investigation.

Confidence in, and respect for, the work of our department, by the superintendents and foremen of the manufacturing departments, is vital. The medical department, after a careful examination, may give the individual a certain rating for job placement. Unless our rating is respected, and the employee placed on the type of work for which he is probably physically or tempermentally fitted, the object of the medical examina-

tion will have been defeated. Also, without their co-operation, the opportunity to re-examine employees whose production and quality had deteriorated for no obvious reason would be limited.

All broad problems or questions of policy are taken up with the head of industrial relations, and through him, the general manager, when necessary.

Our industrial set-up is shown in the following chart:

General Manager
|
Industrial Relations
|
Personnel and Employment | Medical Department | Safety Engineering Claims
Superintendents of Departments
|
Foremen

Functions of the Medical Department:

1. Physical examinations.
   - Pre-employment examinations.
   - Periodic examinations.
   - Post-leave of absence.
   - Interdepartmental transfers on B ratings.
2. Infirmary service....
   - Injuries—wounds, contusions, sprains, fractures.
   - Illnesses—dermatoses, emotional upsets, human relations.
3. Plant sanitary inspections.
4. Records—complete and detailed.

Pre-employment medical examinations are of primary importance. In fact, we believe they are vital to our successful subsequent medical service. Without these examinations, it is impossible to determine the physical or mental fitness for work. Neither can the physically or the mentally handicapped be intelligently allotted to jobs which are within their capabilities.

The examination should be comprehensive and complete, and sufficiently detailed to give an accurate picture of the adaptability of the individual to any particular job or jobs.

DR. E. A. IRVIN, Medical Director of Cadillac Motor Car Division, G. M. C., in a recent article, divides the physical examination into four parts:

(a) Medical history.
(b) Physical examination.
(c) Laboratory studies.
(d) Personality study and evaluation.

This division seems very well balanced and logical. I am particularly interested in the last, pertaining to personality study. We have found that the individual having an unstable nervous system is one of our most perplexing problems. It may be called nervous or mental instability, maladjustment, neuro-mental handicap, or whatever you wish, but the fact remains that this type does not stand up in the high speed production line. They are prone to be unreliable and unpredictable, and their absentee record is usually high. This condition has been assuming progressively more and more importance since the war. The returning G. I.'s have come back, out of step with civilian life, many times their nervous systems profoundly disturbed by the experiences through which they have been. These men, unless they are thoroughly studied, carefully guided, and placed on work which is pleasing to them and within their capabilities, are liable to remain out of step with their surroundings.

In 1945, we amplified our physical examination form to make it more comprehensive and complete. On this form, Fig. 1, particular emphasis is placed upon the history. This, we believe, is of equal importance to—if not of more importance than—any other division of the examination. The history, if carefully and tactfully obtained in detail, will give an invaluable picture of the background of the individual. To get the best results, it should be taken in private without appearance of haste or of prying into personal affairs. This information can be obtained very successfully by the nurse after adequate training. In fact, I believe that if she is the right kind of nurse, she will be able to get more helpful facts than might be given to an examining physician. The process of obtaining this history also gives her the opportunity of intelligent personality study. The impressions gained by our nurses have subsequently been proved to be accurate in a very large percentage of the cases studied. The history also gives a record of previous surgical and medical experiences which may have an important bearing on the probable efficiency of the prospective employee, and be a guide in proper job placement.

The physical examination must be sufficiently full and complete to give an accurate picture of the ability of the applicant to perform physical labor. It must also show any and all physical defects which would limit that capacity. It includes a complete chemical examination of the urine in every case, and chest x-rays wherever they seem indicated. It is our belief that routine x-rays are highly desirable, but conditions beyond our control make them inadvisable at the present time. Blood examinations and hemaglobin estimations are done occasionally. Hintons we do not consider too important from the industrial standpoint, and they are taken only on restaurant workers, or where definitely indicated.

The physical examination needs no detailed discussion, but visual acuity, hearing, the condition of the heart, blood pressure, varicose veins, herniae, and presence of sugar in the urine deserve special consideration, as it is in this group that we have most commonly found the defects which indicate unfitness for work, or call for very careful discrimination in job selection. Applicants with varicose veins, diabetes, or herniae are not only a hazard to themselves but also to the company, because, with the first two conditions, even a slight injury to the leg or foot may take weeks or months to heal, and the period of disability is compensable. Also, employees with herniae can collect for an aggravation of the existing condition if this aggravation occurred as a result of their work.

When any of these defects are found in the old employee, who has perhaps never had a complete physical, and now comes in for a check-up, the problem becomes particularly difficult. There should be, and is, a definite obligation on the part of the company not to deprive this employee of his right to work, unless his own life is endangered thereby, or he is a definite hazard to his fellow workers. We can, and do, insist that they place themselves under the care of their own or some competent physician, and report to our hospital at frequent intervals for check-ups. Incidentally, we have found a number of cases of uncontrolled diabetes, and several cases of active tuberculosis, which are now under rational treatment.

After complete examination, the individual is evaluated on the basis of physical, mental, and personality findings. It must be determined whether he or she is able to do any type of work, or be restricted to certain kinds of work. This determination must be made with great care, and without bias, taking into consideration all of the factors involved, as the conclusions reached are of the greatest importance, and far-reaching, and will have a direct bearing on the earning capacity of the prospective employee. After the conclusions have been reached, they are recorded on a section of the

INTERNATIONAL SHOE CO.
EASTERN DIV.

A216

PHYSICAL EXAMINATION

NAME ADDRESS DEPARTMENT OPERATION
AGE S. M. W. D. NATIONALITY MALE FEMALE
MEDICAL HISTORY: TB. DIABETES HEART HYPERTENSION FAINTING SPELLS ARTHRITIS
SURGICAL HISTORY:
WAR RECORD: U. S. E. T. O. PAC. DURATION DISCH. POINTS MEDICAL
4F MALARIA TROPICAL DISEASES WOUNDS OR INJURIES TRENCH FOOT

DATE			
HEIGHT FT. IN. WEIGHT LBS.			
GENERAL APPEARANCE ALCOHOL			
EYES CORRECTED			
VISION—FAR RT. LT. RT. LT.			
NEAR RT. LT. RT. LT.			
EARS HEARING RT. LT.			
NOSE, THROAT			
TEETH GOOD MED. POOR ARTIFICIAL			
NECK			
ARMS AND HANDS			
BACK SKIN			
HEART PULSE			
LUNGS			
HERNIA ING. FEM. UMB.			
LEGS V. V. FEET			
ABDOMEN			
BLOOD PRESSURE SYS. DIAS.			
CATAMENIA DYSMEN			
CHILDREN MISC.			
REFLEXES KJ. TREMOR			
RECTAL HEMORRHOIDS FISTULA			
G. U.			
LABORATORY DATA			
URINE SP.GR. REAC. ALB. SUG.			
ACETONE DIACETIC BILE			
BLOOD HGB. HINTON			
X-RAY			

PHYSICALLY
FIRST CLASS AVERAGE DEFECTIVE UNFIT
MENTALLY
ALERT AVERAGE DULL

SUMMARY AND RECOMMENDATIONS

A. FIT FOR ALL WORK.
B. FIT FOR WORK UNDER PERIODIC MEDICAL REVIEW:
1. WITH LIMITED PHYSICAL EXERTION.
2. IN NON-HAZARDOUS WORK.
3. WITH ORTHOPEDIC DEFECT.
4. WITH DEFECTIVE VISION.
5. WITH DEFECTIVE HEARING.
6. WITH NEUROMENTAL HANDICAP.
7. ALBUMINURIA SUGAR CARDIOVASCULAR
8. ALCOHOL
C. UNFIT FOR WORK AT TIME OF EXAMINATION.

RATING: .....

REMARKS:

NURSE .....

DOCTOR .....

Fig. 1.

MEDICAL RECORD

NAME ..... DEPT. ..... PAYROLL NO. .....

DATE REPORTED	DATE DISCHARGED	TREATMENT AND REMARKS

Reverse of Fig. 1.

examination form. These ratings are placed on the employment slip in code, and go to the personnel department for their guidance.

Infirmary Service

INFIRMARY medical service involves a contact with an almost unlimited variety of conditions. It includes the care and disposition not only of injuries, but of illnesses of all types, ranging from colds, tonsillitis, headaches, constipation and its results, digestive disturbances, dysmenorrheas, emotional upsets, hysterias, dermatoses, and human relations.

Shoe manufacturing is a light industry, so most injuries would be classed as minor, although occasionally, loss of fingers, a hand, or major fractures, which entail long periods of lost time, occur. These, however, are very infrequent on account of excellent safety supervision.

In the care of wounds, prompt first aid outweighs in importance any specific type of dressing, although I do not wish to minimize the necessity of skillful and adequate surgical treatment, and involves close cooperation with the manufacturing departments. At the International Shoe Company, the foremen and employees are now acutely accident-conscious, so practically all injuries, regardless of how trivial, report immediately to the hospital. On account of this, we have been able to reduce our incidence of infections to a minimum. We almost never have lost time. In fact, most of our wounds, contusions, crushed fingers and toes, with proper dressings and guards, are able to return to work. Muscle strains, particularly of shoulders and backs, are quite a problem. We have, however, been quite successful with physio-therapy, consisting of baking with radiant heat and massage. Adequate back strapping has also been definitely worthwhile. We use radiant heat in preference to infra-red or diathermy because it is safe which is an important item in industry. X-rays are taken on everything where there is the *slightest* indication. The cost in time and material is far outweighed by the psychological effect on the employee.

ILLNESSES: A goodly number of the illnesses occuring in the plant report voluntarily. We also have a shop rule that any operator wishing to go home must first report at the hospital. In this way, we have a check on practically everything. All cases are thoroughly examined, and those having temperatures, symptoms of grippe, respiratory infections, or other potentially serious illnesses, are sent home and referred to their family physician. The others, which are in the large majority, are given simple indicated treatment, perhaps a rest period, and willingly return to work. This applies to the dysmenorrheas, which, in the past, have been such a prolific cause for absenteeism. The cases of emotional upsets and hysterias are an annoying problem, but when handled tactfully, and the cause of the disturbance determined, their nervous systems can usually be adjusted, and they also return to work. These cases, as a class, tax the resources of the nurse.

DERMATOSES are a headache. Employees are prone to associate any skin blemish with their work, and, in their minds, leather dust is a particularly offending agent. In differentiating occupational from the non-occupational rashes, it is important to know the particular type of work to which the employee is assigned, whether they come in contact with dyes, lacquers, cements, or white show powders or dressings. It is also important to know the composition of these agents, the pH, etc. Home contacts are also worthy of investi-

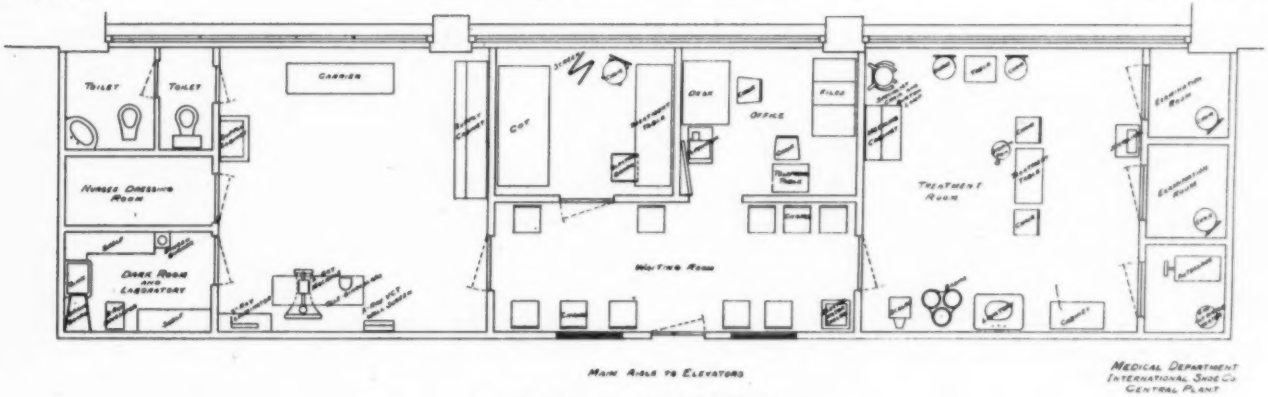

Fig. 2. Layout of Medical Facilities.

gation. In tanneries, chrome is important, and adequate protective measures must be carried out.

SYSTEMIC POISONING: We have had no experience with this for a number of years. We did have, at one time, two cases of benzol poisoning. The benzol was eliminated, and has never come into our factories since then. One should be constantly on the alert for any of these toxic agents, however.

HUMAN RELATIONS: This is a broad and vague term, and difficult to define accurately, but I believe it is the relationship where employees are willing, and eager, to come to the hospital and unburden themselves of their intimate personal troubles. It may be a sick child, a wife, or husband, an impending surgical operation, marital difficulties, slander from neighbors or fellow workers, financial problems, or it may be that they are simply depressed and lonely, and seek comfort from one who is sympathetic and understanding. Not infrequently, it is possible to find a solution to their problems, and, even if not, they go back to work happier in having had the opportunity to open their hearts to one whom they respect and in whom they have confidence. The sincerity of these people is illustrated by the remark of an elderly gentleman after one of these interviews. He said "It is wonderful to have a place like this to come to. You nurses are so motherly." There may be an element of humor in this, but underneath the humor, it is basic. A considerable amount of our work is of this type. It is definitely worthwhile, and its effect is far-reaching. Obviously, these interviews are confidential and do not appear on our records.

The efficiency of a medical department is measured not by how few but how large a percentage of the working force seek advice and treatment during the year. Following is our record for the year 1946:

ANNUAL REPORT—JANUARY THROUGH DECEMBER, 1946
CENTRAL PLANT MEDICAL DEPARTMENT

Average number of employees	1,600
Physical examinations	2,081
Re-dressings	1,827
Medical treatments	3,212
Colds	1,316
Injuries through July	1,094
Physio-therapy	911
X-rays	111
Incomplete examinations	141
Occupational injuries—August through December	409
Non-occupational injuries—August through December	235
Total	11,337

MONTHLY RECORD—1947

January	1,364
February	1,075
March	1,223
April	1,265
Total	4,937

PLANT SANITATION is the responsibility of the medical department: to see that floors are kept free of dirt, dust, and litter; that washrooms and toilets are constantly policed; that bubblers are frequently inspected, in good working order, and that proper salt tablet containers are in place. Food scraps, spilled tonics, food and drink containers, must be eliminated on account of fly hazard. The importance of all this is obvious, but the chief difficulty is to impress this importance on those directly responsible for the housekeeping. The restaurant calls for particularly rigid inspection on general cleanliness, care of food, freedom from flies and fly hazards.

The condition of spray hoods, suction fans and ducts over dust-producing machines, defective or splintered racks, racks obstructing passageways, or the presence of oil, paste or other slippery substances on floors are

primarily problems of the safety department, but are so closely related to surgical and medical casualties that they deserve our close attention.

Room temperatures, humidity, ventilation and lighting are other items worthy of note.

Records

RECORDS are the heart of any industrial medical set-up. To be of value, these records must be complete and in detail, and every visit of an employee to the hospital should be noted with the pertinent facts in regard to it.

These records become a permanent medical and surgical history of the individual while in the employ of the company. If complete, they constitute valuable evidence of the validity or invalidity of claims, and have a definite deterrent effect on unjust litigation. On the other hand, an inaccurate or incomplete record is not only worthless, but a distinct legal menace. These records should be made in longhand by the attending nurse.

A good record is also an asset to the employee as it acts as a complete picture of all deviations from the normal—recurring or persistent symptoms, many times progressive, which might be obscure danger signals of a functional or organic condition demanding skilled investigation and treatment. From our records, we have been able to tie up returning G. I.'s with the Veterans Administration, and help to establish their disabilities as service-connected.

CASE HISTORY: *S. W. R.*, age 31, employed by International Shoe Company November 29, 1945, while on terminal leave. Served four and three-quarters years in E. T. O., was a P. O. W. in Germany for five months. Received shrapnel wounds of right leg, had slight attack of trench foot, and stomach trouble. Army discharge December 29, 1945, on points. On March 29, 1946, he came to the hospital complaining of epigastric distress, diagnosed by Dr. D. W. Parker as questionable ulcer. A letter was sent to The Veterans Bureau. He was sent to the Portsmouth Naval Hospital on April 8, 1946. Returned to work on May 9, 1946, with diagnosis of gastric ulcer. While at Portsmouth Naval Hospital, he received a letter from Washington stating he had no service-connected disability. His claim was given to the Disabled American Veterans. They were unable to get service-connected disability until given a copy of our original examination. He then received service-connected disability rating, and is now being handled and cared for by the army.

Record forms should be sufficient to furnish all necessary and pertinent data. All patients reporting to the hospital are first entered on the daily record form with the diagnosis and disposition of the case. This gives a check on possible epidemics of colds, sore throats, grippe, or any unwarranted number of conditions of any particular type. It puts us on the alert for preventive measures.

These daily records are then transferred to the employee's personal medical history form. We also have a daily absentee record form which comes to us each morning from each manufacturing department. Each absentee is carefully checked by us, and also by the personnel department, if indicated. We also keep monthly summaries of hospital visits and absenteeism.

These records are filed in the hospital record room. They are not removable, and are accessible only to those to whom the record is important in the solution of some problem.

Summary and Conclusions

THIS paper has presented nothing new or original. It has been an attempt to outline the work that is being done by the medical department of the International Shoe Company in the East. We appreciate that we have many shortcomings, but these are being rectified as fast as is feasible. Our nurses are occupied

ABSENT FROM WORK A. M.

Date 194

Department

No.	NAME	Work	Reason for Absence (IF KNOWN)
	1		
	2		
	15		

Signed Foreman

This report should be sent to the Office each Afternoon.
If no one is absent, mark "none", sign and send to office.

Fig. 3.

INJURY REPORT
ILLNESS

TO - CENTRAL PLANT HOSPITAL

FROM FACTORY

PERIOD END

DATE	NAME	DEPT.	INJURY	CAUSE	TREATMENT	BY	DISPOSAL

Fig. 4.

every minute of every working day, and frequently do overtime. The records are very time-consuming, but we feel that they are too important to be delegated to a clerk without professional training or experience.

Although at the present time statistics are not available, our present system is working satisfactorily. We feel certain that the expense of the department is not only being absorbed, but is paying dividends. We practically never have litigation, and our compensation costs are lower. Our employees are cooperative, their morale is higher, and absenteeism is below average.

In closing, I wish to express my appreciation to MR. FREDERICK J. VINTINNER, of the State Board of Health, to DR. ROBERT KERR, of the New Hampshire Tuberculosis Association, and to DR. FORREST DRURY, of the Veterans Administration, for their hearty cooperation and assistance in many of our problems.

Practical Experiences with Dangers and Illnesses from Plastics

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THE TERM plastics, as used today, is applied to those products of the chemical industry known as synthetic resins and to the products made from these resins. Natural resin is defined as any of various solid or semi-solid organic substances, chiefly vegetable, yellowish to brown, usually transparent or translucent, non-conductors of electricity and soluble in ether, alcohol, etc., but not in water. Synthetic resins range from rigid molded materials, such as telephone receivers, to flexible sheetings, such as raincoats and shower curtains, from adhesives to cloth coatings.

The finished product, made of plastic, will commonly have gone through several manufacturing processes; raw materials may have been synthesized in one plant, another plant will produce the basic resin, final utilization will be performed in many types of manufacturing processes associated with the present extensive use of plastics. Some synthetic resins are used by manufacturers to make paints, varnishes and lacquers; other resins are used in the formulation if industrial saturants and adhesives. In still other forms, these plastics are converted by plastic molders, laminators and fabricators into countless industrial and consumer products used in communication and transportation equipment, in building construction, in wearing apparel and in electrical apparatus.

Plastics may be classified according to their reaction to heat. Thus thermoplastic plastics are those that can be reheated and the plastic will revert to essentially the same form as when originally heated. Thermosetting plastics, however, when completely reacted by heat or heat and pressure, become infusible and insoluble and if heated again cannot be remolded or worked. Further heating will only cause destruction.

Hazards

THE basic materials used in the production of resins may frequently be toxic. One of the first commercially important synthetic resins was made by combining phenol and formaldehyde, both having certain toxic properties and both well known to chemists and physicians for many years. However, when such a resin is completely reacted, the toxic properties of the individual materials are no longer present.

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Following the use of phenol and formaldehyde, plastics were made with urea and formaldehyde and then such materials as vinyl chloride, vinyl acetate, styrene, ethylene, methyl methacrylate, and many other materials. Some of these compounds have definite toxic properties also, while others have toxic properties that are negligible. However, these synthetic plastics are produced largely in enclosed systems which, under normal operating conditions, protect workers from harmful exposure. Experience has shown that rarely is systemic intoxication a problem among the workers making the basic resin.

Complete reaction of the basic materials forming a resin, in nearly all cases, gives rise to an inert product. However, the basic manufacture of certain resins frequently does not involve complete reaction. This enables the industries utilizing these resins to mold, fabricate, etc., according to the process of manufacture necessary to finish their product. The incomplete reaction will allow certain toxic properties to persist to a minor degree and those using these resins may be confronted with toxicological problems. Whereas, the primary manufacturer usually understands and controls the hazards, the "secondary" manufacturer may not understand even though the toxic hazard has been greatly reduced. Manifestations of such lack of control are commonly in the form of dermatitis in establishments unfamiliar with preventive measures that may be necessary.

A great number of modifying agents may be added to the resins themselves, changing their characteristics to meet industries demand. The hazard of systemic intoxication in the basic manufacture of plastics may be associated with these. If such agents are added by the "secondary" manufacturer, he likewise may introduce a hazard.

Again, however, the finished plastic containing these materials is essentially inert. In those resins whose reactions are incomplete in the primary manufacture, reaction has been sufficient to reduce the hazards to a minor degree. Furthermore the modifying agents having toxic qualities make up a very small percent of the plastic. It is when adding these materials at the time of basic manufacture that a hazard may exist. As has been stated earlier, production of the basic resins are performed to a large degree in enclosed systems which, under normal working conditions, protect the worker. However, in "charging" the system or in making the "blends" of material to be processed, opportunity for toxic exposures are available. In certain types of plastic manufacture, these agents may be changed from time to time or even day to day. For the very reason that total amounts are small and materials changed frequently they must be watched closely so that some new toxic agent is not added or an old one used again without proper protection of the worker through ventilation, respirators, medical examinations, etc., as necessary.

Modifying Agents Added to Plastics

THESE agents may be classified as follows: fillers; colors; solvents; plasticizers; stabilizers; antioxidants; lubricants; hardeners.

FILLERS: Usually these constitute such materials as wood flour, walnut shell flour, paper, cotton as fibre or fabric, glass fibre, diotomacious earth. These materials do not give rise to a toxic hazard. Even the fibre glass fabric has not caused any remarkable skin irritation. These fillers are added to molding compounds and may be used to build laminated plastic products.

COLORS: Small amounts are usually all that is needed

of the colors. They are of the type used in textiles, etc., and would not be expected to give rise to hazards.

SOLVENTS: Many different solvents have been used in plastic manufacture. New ones are being added and old ones discarded. Definite hazards may of course be associated with many of the solvents and it is necessary to know the solvents being used in any given operation in order to protect the workers.

PLASTICIZERS: This likewise is a large group of materials (over 150). They are important in reducing brittleness of plastic. They may be used singly or two or more may be added. Addition of two or more will decrease the "sweating out" sometimes found when only one is added. In some of the more flexible plastics, 50% may be plasticizer. Some plasticizers are skin irritants and may give rise to dermatitis during manufacture. However, one need not expect further trouble after the materials have been reacted, although if the plasticizer should "sweat out" it is possible an individual may react to it. Plasticizers include such materials as natural gums, phthalic acid derivatives, glycol derivatives, glycolic acid derivatives and many others.

STABILIZERS AND ANTIOXIDANTS: Are materials that prolong the life of plastics by protecting them against the effect of light, heat, etc. They include compounds made up of organic and metallic radicals. Some of these are primary skin irritants, and will cause systemic reaction if absorbed. However, the amounts used are small and in common practice, little hazard has been associated with their use.

LUBRICANTS: Oily materials are necessary in certain resins to aid in molding, etc. Such oils as mineral and castor oil may be used. No specific hazard has been associated with their use.

HARDENERS: These are materials used to aid in setting of certain resins. Hexamethylenetetramine (Hexa) is most frequently used and is a well known sensitizing agent. Exposure to it must be kept to a minimum if cases of dermatitis are likewise to be kept to a minimum. This is necessary even if some of the workers can practically dust themselves with it and still not develop dermatitis. After it is added to the resin and reaction is completed, no further trouble will follow.

Control of Hazards

ALTHOUGH the hazards of systemic intoxication are generally not great, the chemicals involved in plastic manufacture are many. At the Bound Brook plant the total number of raw materials approaches 1,000 for all phases of plastic manufacture. It is the responsibility of the Medical and Safety Departments to know what materials are used, what hazards are involved and institute the proper control measures. It will be found that many compounds have been used for years in industry and much knowledge concerning their toxicity has been compiled. Under this group would appear lead, toluene, carbon tetrachloride, benzol, acetone, alcohols, phenols, various acids. Some of these materials may not be used in production but may have other uses such as cleansing agents, etc. Review of the process and quantities of materials used or involved will immediately give a rough, quick guide as to the degree of hazard, if any. Further studies and protective procedures can be instituted as indicated.

There will be other chemicals as new plastics are made or new modifying agents will be used whose toxicology is unknown or little known. Many of these will not be toxic as used. However, since injury can occur to workers if even one out of hundreds of such chemicals should be puite hazardous and be used on a large scale production basis without proper protective measures, one must have some guide to the possible hazard. Animal range-finding tests will assist greatly in obtaining this guide. The other form of control, when toxicological information is scant, involves one of the most basic principles of industrial medicine; adequate medical and laboratory examinations of the workers. By such examinations, deleterious effects of working environment can frequently be uncovered early and remedial action taken before any serious or permanent harm has been done the workers.

In actual practice, good general ventilation is all that is necessary for many operations. On hot molds, rolls, calenders and ovens, it is frequently necessary to use hood and local exhaust ventilation to remove vapors at their source. It will be necessary, in weighing certain modifying agents, to perform this operation under hoods. Where there is possible exposure to lead or solvents, appropriate medical and environmental examinations will be indicated.

In contrast to the general relatively slight hazard of systemic intoxication in plastic manufacture is the possibility of local injury—dermatitis. Some of the chemicals can be classed as primary skin irritants. However, trouble from primary skin irritation or true contact dermatitis is not common. The more frequent problem is sensitization dermatitis. Formaldehyde and "Hexa" are common offenders. In mild cases, an immunity (decrease in sensitivity) may be built up and the individual may continue to work with the materials.

The dermatitis seen in the manufacture of plastics commonly arises from exposure to dusts or vapors. Its control is brought about by using the various measures of decreasing exposure. Although most cases are on a sensitization basis, decreasing exposure and thus decreasing dosage will definitely lower the incidence of dermatitis. Good general ventilation and local ventilation on hot rolls, etc., as previously mentioned, will reduce vapor concentrations. If a dusty process is causing excessive exposure, again, ventilation will reduce it.

When materials are known to cause dermatitis, direct contact with the skin should be avoided as much as possible. Good housekeeping, with frequent cleaning of working areas and equipment, will reduce exposure as will personal cleanliness, with showers and change of clothes. Under some conditions, personal protective equipment, such as gloves and aprons, may be helpful. Protective creams may be used but are subject to limitations that are well known. However, if a certain amount of skin contact is necessary and the worker does not substitute the cream for cleanliness, benefit may be derived. Denatured alcohol is helpful in removing some adhesives from the skin. This should always be followed by thorough washing with soap and water. If there is a tendency for the skin to dry, a "conditioning cream" should be used to replace the lost greases.

In the case of some of the insoluble dyes, it has been found that the following solution is quite helpful in removing them from the skin, especially when large amounts have been splashed on the individual: "Mixture of cotton seed or corn oil, isopropanol and green soap."

Conclusion

THE health hazards associated with the manufacture of plastics are not of an extreme nature. Many of the hazards are associated with materials that have been used by industry for years. New materials are appearing steadily and will bear close scrutining as to their toxic properties. The manufacture, molding and fabricating of plastics, is a combination of chemical

and mechanical processes. The control of the hazards is brought about by consideration of the toxicity of the material, the amounts used, and then instituting adequate environmental, personal and mechanical protection. A common problem encountered is that of sensitization dermatitis. Actual cases can be kept to a minimum by instituting dermatitis control measures. Opportunity for systemic intoxication exists in the use of modifying agents added to the resins. In certain processes, because of frequent changes, they must be watched closely to prevent injury. New chemicals should be tested by a range finding test and followed closely by proper medical examinations until sufficient experience has been gained to evaluate their toxicology.

The Use of Sodium Fluoride in the Manufacture of Steel

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IN THE past few years, the industrial and non-industrial uses of fluorine compounds have expanded so rapidly that its production has increased from pounds per day in 1942 to tons per day in 1947. The list of occupations and trades that come in contact with some fluoride containing compound runs from the extractor of raw materials such as the miner to the ultimate consumer. New and recent uses of fluorine compounds have been found in plastics, germicides, anesthetics, stable solvents, fire-proofing materials and resins of innumerable applications. Uranium hexafluoride was used in the construction of the atom bomb. Another fluoride compound, sulphur hexafluoride, has proved to be a nearly perfect insulator for high voltages. The use of fluorine compounds in the manufacture of metal products has been known for years; in fact, the name "fluorine" itself meaning "flux" or "flow" gives the key to a major use in the metal industry.

However, the knowledge concerning the toxicity or potential hazards associated with industrial processes utilizing fluorine compounds has by no means kept pace with the expanded industrial demand. It is only within comparatively recent years that the serious nature of fluorine poisoning was recognized by professionally interested people. From the correspondence we have received, it is only within recent months that industry in general realized that the fluorine compounds they were using in their industrial operations were toxic materials.

The recent publicity concerning the use of sodium fluoride in the production of "rimmed" steel stimulated a lively interest throughout the country on this one particular phase of the fluoride problem. In the main, this interest was confined to four questions:

1. Why and how is sodium fluoride used in the production of certain types of steel?
2. Is the use of sodium fluoride general throughout the steel industry?
3. What methods of sampling and analysis are used for the determination of fluorine in the atmosphere such as that produced in the manufacture of rimmed steel?
4. Does sodium fluoride as used in the production of rimmed or effervescing steel constitute a health hazard?

This paper is an effort to answer the first three questions and should only be considered as a contribution to the research work that should be done to answer the last.

In the production of steel ingots to be used in the manufacture of sheet steel, it is highly desirable to have an ingot whose surface is free from blow holes, and to have a skin that will not tear and crack under the rolls. These desirable attributes can be attained in "rimmed," "open" or "effervescing" steel under certain conditions. Rimmed steel is made by a process which permits the free escape of gases from the metal during solidification in the molds. The evolution of escaping gases is apparently due to the nitrogen, hydrogen and the carbon monoxide formed by the reaction between the iron oxide and the carbon present in the molten steel. It is obvious that in order to produce a good rimming steel free from blow holes or occluded gases, it would be highly desirable to prolong the reaction time and to preserve the fluid state of the metal which would enhance the escape of the gases.

In June, 1928, a patent was issued to Arthur Tregoning Cape who claimed that the addition of one to six ounces of sodium fluoride or fluorspar to 3,000 pounds of molten metal would sufficiently prolong this reaction time and extend the duration of the fluid state to release the optimum quantity of gas producing a good quality of rimming steel. Mr. Cape was employed by the Republic Steel Corporation at its Massillon, Ohio, plant and the process was first used there in about January, 1927.

During the past 19 years and up to the present time, there have been and are about 50 steel plants in the United States that use sodium fluoride in the production of rimmed steel. These 50 plants produce about 7,000,000 net tons of rimmed steel per year by the sodium fluoride process. The open hearth division of one industrial plant in Michigan in which the sodium fluoride controversy received so much publicity is comparatively a small producer of sodium fluoride processed metal. It probably produces less than 7,000 net tons yearly. In addition to being a comparatively small producer, it uses close to the recommended minimum amount of sodium fluoride in their steel or two ounces per ton. As far as we have been able to determine, it is only within the past year or two that there has been any controversy regarding the toxicity of sodium fluoride as used in the steel industry in any steel plant in the United States since its introduction in 1927.

The usual open hearth steel plants are long, rectangular-shaped buildings with furnaces and charging floor on one side and a pouring platform on the opposite. Between the two is the pouring pit. Overhead cranes operate along the length of the building between the furnaces and the pouring platform and above the pouring pit.

Since in our particular study the controversy centered around the crane operators, this operation deserves a more detailed explanation. The crane operators' cabs are of the enclosed type with windows on three sides. When the metal is ready for pouring, the crane operator moves the crane and the ladle over to the furnace. When the ladle is filled with molten steel, he moves the crane and the ladle over to a row of ingot molds. These molds are placed close to the pouring platform. The crane cab is about 7 feet to the right and 10 feet above each ingot while it is being poured. The men operating the pouring spigot which allows the metal to flow into the molds are stationed on

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the pouring platform just to the right of the ladle and ingot. Additional men are stationed to the left of the ladle and ingot who wet and cap the molds after the rimming action has ceased. The sodium fluoride is previously prepared in small paper bags of four ounces each. After a small quantity of metal has been poured into the ingot, five four-ounce bags are thrown into the ten-ton ingot mold.* After one ingot is poured, the crane operator moves his crane and the ladle about 5 feet to the right to pour the next ingot. This operation is repeated until the ladle is empty and about 20 ingots have been poured. The duration of the complete cycle of operation is approximately 45 minutes.

While air samples were taken throughout the whole plant area, our sampling stations were concentrated on the pouring platform and in the crane cabs. The air was sampled in the most strategic locations before, during, and after the pouring operation. Thus, we had an indication as to the speer with which the fluoride concentrations accumulated and the rapidity of dissipation after pouring. Other factors such as the direction of air movement in relation to the work stations, open and closed crane cab windows, etc., were also considered in the choice of sampling locations.

Both the impinger and the electrostatic precipitator were used for sampling the atmosphere. The precipitator was used to collect the particulate matter, and the impinger containing 100 ml. of 2% NaOH was used to collect the hydrogen fluoride gas that might be present. Since the electrostatic precipitator was run at the rate of 3 cubic feet per minute and the airflow through the impinger was set at 1 cubic foot per minute, it was necessary to insert a Y tube in the line between the precipitator and the impinger to allow the excess air from the precipitator to escape into the atmosphere. Therefore, theoretically, all the possible sources of fluorine were being sampled.

The electrostatic precipitator samples were transferred to beakers from the sampling tube by scrubbing with a curved glass rod covered with tygon tubing, using a mixture of isopropyl alcohol and water. The contents of the beaker were made alkaline to phenolphthalein with NaOH solution and evaporated to a small volume to remove the isopropyl alcohol.

The distillation and subsequent estimation of fluoride were then carried out as described in the bulletin prepared by the Aluminum Research Laboratories of the Aluminum Company of America entitled "Determination of Fluorine" 914 (12-44).[1]

The amount of fluoride in the samples was determined by means of a single Willard-Winter distillation[2] from sulfuric acid as modified by McClure[2a] followed by estimation of the amount of fluoride in the distillate according to the Talvitie Rapid Routine Method.[3]

Impinger samples were transferred to a beaker, evaporated to a small volume and determined as above.

In the first of the three studies made, the air was sampled in the crane cabs only and our highest concentration was found at that time. With the crane cab windows open, a concentration of fluoride was found of 30.2 mg. per 10 cubic meters computed as fluorine. On the basis of a maximum production of three heats of steel per day, or a total exposure time of 135 minutes, the concentration to which the workmen were exposed was calculated to be 8.5 mg. per eight-hour day. This can be compared to the maximum allowable concentration of 25 mg. per 10 cubic meters for an eight-hour exposure.

*It was observed, in the first study made in the plant, that the sodium fluoride was added to the ingot by means of a long-handled scoop. On subsequent studies, this technique was changed to the one described above.

On our second and third studies the highest concentrations were found on the pouring platform with the wind direction toward the area in which the sample was being taken. The highest concentration found in these locations was 13 mg. per 10 cubic meters of air during the pouring operation or, calculated on the basis of the maximum exposure of 135 minutes per day, 3.65 mg. per 10 cubic meters of air on an eight-hour exposure basis. The fluoride concentrations were lowest in the furnace charging and pit areas. In general, the higher concentrations were found in the breathing zone of the ladle men, the cappers and the crane operators. However, as indicated from the figures just cited, all the results obtained in the above locations were within a satisfactory range. Although all these findings were within the satisfactory limits, we believe that a further reduction in fluoride concentrations is possible and, in the long run, may be desirable.

The fluoride exposure at the rimmed steel operation depends on the general room air currents conveying the contaminant into the breathing zone. Consequently, the samples collected under various conditions vary in concentration depending upon the direction of the air currents. The crane cabs have been equipped with ventilating units employing cloth and activated charcoal filters. In our opinion, such filters are of doubtful value. The original efficiency of these filters is questionable and, in addition, it has been our experience that consistent maintenance necessary for efficient filter operation is difficult to maintain.

Fundamentally, it is not logical to permit contamination of the general workroom atmosphere and then provide personal protection from it. Good practice indicates that the contaminant should be collected at the source thus providing protection for all workers. We, therefore, recommended a local exhaust type ventilating system. We believe that an installation of this kind is feasible and practical, considering the plant layout and scheme of operation of open hearth steel producing plants.

I am not going into the symptomatology or pathology of fluoride intoxication. Much has been written on the subject. It should suffice to point out that acute exposure of ingestion of soluble fluoride containing compounds produces immediate vomiting, abdominal pains and diarrhea, followed by convulsions. Death usually occurs within a few hours.[4] An acute exposure of this nature is hardly conceivable in industry and could only occur by accident or intent.

There are many symptoms of fluoride poisoning due to chronic intoxication such as the corrosive effects on the upper respiratory tract, nasal irritation,[7] mottled teeth,[14] dyspnea,[8], dermatitis and chest involvement,[9] gastrointestinal symptoms, anemia,[17] etc. However, the outstanding characteristic of chronic fluoride intoxication is the appearance of osteosclerosis or fluorosis.[5]

While there is general agreement on the pathological symptoms of fluorine intoxication, there has been and still is considerable discussion as to what levels of fluorine absorption will produce these pathological symptoms.

Most of our information on the toxicity of sodium fluoride is based on ingestion experiments. The inhalation experiments have been limited almost entirely to hydrogen fluoride.

As far as acute intoxication is concerned, Roholm[6] reports that the minimum quantity of soduim fluoride that has caused death in man was about 4 grams. The effects of absorbing small amounts of fluorine com-

pounds over long periods of time have been studied by several workers. Outstanding work has been done by Roholm,[5,10] in exposure to cryolite and the relationship of bone changes to length of employment of cryolite workers. Excellent work has been done by Machle, Largent, *et al.*[6,11,12,13,18] on the ingestion and retention of fluorides in the body. Work has also been done on the effect of fluoride containing water to the human body by McClure and Kinser,[14,15,16] by Pandit and Raghavachari,[20] and Hodges[19] and his co-workers. Work has also been done on the toxicity of fluorine containing beryllium ores by Shilen,[9] by Gelman in Russia,[21] Weber and Engelhardt,[8] in Germany, and VanOrdstrand[22] in this country, as well as Galloway and Mellor.[9]

In reviewing the work of these men in detail, we cannot find sufficient evidence to show that the maximum permissible concentration of 25 mg. per 10 cubic meters of fluoride in air computed as fluorine with reference to inorganic fluorides only or three parts per million of hydrogen fluoride in air as generally accepted by the majority of official agencies should be raised or lowered. It can only be said that at the present time there is not sufficient data to establish a maximum allowable concentration with any degree of precision.

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Role of Codes

—In Industrial Hygiene Administration—

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THE subject assigned to me for discussion has become one of increasing importance in the field of industrial relations. It vitally effects the interests of employers, employees, insurance carriers and the public. Its ultimate solution may well lead to a better understanding between employers and employees so that the health and welfare of persons exposed to hazardous conditions in industrial processes may be protected and promoted. Most of the industrial hygiene codes now effective have been adopted in recent years, and we are still in the field of experimentation with respect to their administration. Practical experience is developing useful information as to their scope, subject matter and policies. It is with respect to these that I would like to direct my remarks today.

During the past decade the subject of industrial hygiene has developed extensive interest and today industry is health conscious and alive to its responsibility to protect the health of its employees from potential hazards that may be incident to employment.

Aside from the humane or moral aspect of occupational disease control, it has simply become good business for employers to concern themselves with the protection of employees from all types of industrial injuries, be they accidental or resulting from occupational disease. The ultimate cost of compensation has proved to be substantially more than that resulting from installation of effective engineering and medical methods of control, while employees are justly demanding that they should be protected from industrial injuries no matter what the cause may be. They have come to realize that maintenance of their health is one of their most valued assets, and they will and should continue their demands that their health should be protected against all potential hazards. The public is justly demanding that the toll of injuries from industrial accidents and disease should stop, and will continue to establish public agencies charged with the duty to accomplish that purpose. Of such agencies, Bureaus of Industrial Hygiene are among the most important and such Bureaus have developed codes, or rules and regulations, designed for the control and prevention of such injuries. This is a most important assignment, far reaching in its ultimate effect.

There are now 38 states,[1] the District of Columbia, the Territories of Hawaii, Puerto Rico and Alaska, and those Federal jurisdictions where the Longshoremen's act is applicable wherein occupational diseases have become compensable by statutory provision. Workmen's compensation acts are effective in all states except Mississippi. Most of this legislation has been of relatively recent enactment and has served to emphasize the need for control of industrial injuries

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1. Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, North Caroline, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia and Wisconsin.

in the various industries that have become subject to these laws.

In many jurisdictions the subject of occupational disease legislation has been highly controversial and has created misunderstandings and phases of disagreement among representatives of employers, insurance carriers, employees and the various state officials and agencies to whom has been assigned the administration of the laws. However, in spite of these controversies and disagreements dealing with the basic subject matter of this legislation, there seems to be one thing upon which all parties agree, namely, that occupational diseases can be controlled; that effective methods exist for their control and for the protection of employees exposed to potential hazards in different types of industrial operations, and that such methods must be employed by industry for the elimination of such hazards.

I do not feel that the obligation for the prevention of occupational diseases rests solely upon the employer. It is his obligation to install such protective equipment and furnish such appliances as medical and engineering science may have found practicable and desirable to control the hazards to which his employees are subjected. However, upon the employee rests the obligation to utilize such equipment, and only by full cooperation between the employer and employee in this respect can the ultimate goal be attained. Aside from the obligation of employers and employees there is the matter of the administration of compensation laws and industrial hygiene codes by state departments, and the formulation of those laws and codes, together with their administration, is the primary responsibility of the individual state departments to which their administration is assigned.

The problems with which these state departments are so concerned are primarily health problems, and in my opinion the activities of industrial hygiene departments should be developed in state and city health departments for the purpose of educating and assisting industry in the protection of workmen against potential hazards. With the development of new industrial processes, the use of new chemical compounds and the resulting creation of new health hazards, there develops the need for the education of industry properly to appraise hazards and to find methods of control so that the possibilities of resulting injury to exposed workmen may be reduced to a minimum. With all of the experience and information available today regarding engineering and medical control, it is submitted that various industries have not as yet found all of the answers to attain perfection in control. In given industries, particularly those manufacturing and using chemical compounds, it will take considerable time to adjust the manufacturing processes and to develop engineering methods that are practical in their application so that they may eliminate hazards and comply with, what we believe today to be, reasonable rules and regulations to prevent injury or disease.

At the present time there are 52 industrial hygiene units established in various state and city departments. Most of these units are under the supervision and direction of health departments. In practice these departments have assumed an administrative policy of education and cooperation with industry, rather than the exercise of police powers to restrain industry from violations. This is most significant and important because such methods of administration will achieve the desired result more rapidly and effectively than any other method. It is a tribute to the administrators of these units that representatives of industry look with confidence upon their activities, welcome their cooperation and assistance in the solution of their problems and utilize the advice and services of such departments to the end that their operations may be conducted in full compliance with all legal requirements.

The fact is, however, that with respect to the form of industrial hygiene codes presently effective, we find, what appears to be almost hopeless confusion. There are 35 codes dealing specifically with control of occupational disease hazards. There are countless other codes dealing with other types of potential industrial health hazards with which industry must comply. For example, in my own state, Maryland, there are some 33 separate codes adopted by the State Industrial Accident Commission, all dealing with separate subject matters, but designed to protect the health of workers. Each of such codes has apparently been adopted without consideration of or reference to the others. Yet each establishes rules and regulations with which industry must comply. These codes have been adopted pursuant to specific legislation or under general health powers granted to departments of health. The subject matter of the codes varies in practically every state. Authority for their administration may be divided among several state departments. Some of the codes are limited in their application to specific industries; others purport to be all inclusive of the industry within the given state. Most of the codes make no provision for information as to ways and means by which industry may effect compliance, and make no attempt to direct or guide industry with respect to compliance.

It must be recognized that industrial conditions differ in the individual states and that in many states potential hazards may exist in manufacturing processes that would not be present in other states. However, to illustrate the dilemma in which a given industry may find itself, we only have to consider the problem presented to a manufacturing company having potential hazards operating in a number of different states. Take, for example, the producer of a given type of mineral that may operate in many states scattered throughout the Union. In each state it may be subject to codes or regulations that vary from those in other states; in one state supervision over administration may be assumed by the department of health; in another state by the department of labor; in another state by the Industrial Commission; in still another by one or more of such state agencies. The lack of uniformity preplexes the manufacturer in its attempted compliance. What may be a permissible concentration of toxic materials in one state may differ entirely in another state. The requirements for protective personal equipment may differ in the various states. Regulations applicable to housekeeping, sanitation, ventilation and illumination are in hopeless confusion, with the result that what may be proper standards differs in every jurisdiction wherein the company operates. To me that does not make sense, and it seems desirable that some method to promote uniformity with respect to this subject will not only receive the enthusiastic support of industry, but would ultimately attain the effective control of potential hazards in a simpler and quicker manner than under the present form of these codes.

It is not my purpose in this discussion to attempt any detailed analysis of the provisions of existing industrial hygiene codes because that subject is so broad that it would be impossible to do it justice within my limited time. May I refer you to a paper recently prepard by J. J. BLOOMFIELD, of the U. S. Public

Health Service, entitled "Codes for the Prevention and Control of Occupational Diseases," presented at the annual meeting of the Industrial Hygiene Foundation of America last November. MR. BLOOMFIELD'S presentation of the subject was execellent and gives an analysis of existing codes with tables setting forth data as to their provision in the various states. However, I would like to make brief reference to what I consider the primary purposes of codes, and make some general comment with respect to their subject matter.

The word "Code" is defined in Bouvier's Law Dictionary as follows: "A body of law established by the legislative authority of the state, and designed to regulate completely, so far as a statute may, the subject to which it relates." It is submitted that perhaps the use of this term with respect to the administration of bureaus of industrial hygiene is unfortunate. My concept of the functions to be served in the administration of bureaus would be to establish rules and regulations that would guide industry in the correction of practices that tend to create hazardous conditions and to assist industry in maintaining the health of its employees. Industry seeks the maximum production of its materials at minimum cost. If our competitive system is to be retained and business is to succeed, bureaus of industrial hygiene must assist in the attainment of this goal by the simplest and most inexpensive methods possible.

I have the highest regard for the individual members of your profession and the personnel of the various state and city departments with whom it has been my privilege to come in contact. You have been specially and adequately trained for the performance of the duties that have been and will be assigned to you. But the fact is that in many industrial processes, management knows as much as or more about its individual problems than the state official would know by a cursory examination of a given industrial plant. Management has lived with these problems for years and has developed the particular processes after extended engineering and laboratory research. It has the problem of producing goods by the most efficient process and developing hygiene control in a way that will be effective but will permit efficiency in the given operation. I feel sure that no one would contend that it is the duty of the hygienist to tell the manufacturer how to run his business. Many industrial processes are so secretive and complicated and have been developed over an extended period of years that it is frequently impossible for an industry within a limited period of time to rearrange that production process to give effect to methods of control that the hygienist woud recommend. I know that the hygienist is conscious of this fact, but it must always be borne in mind in the attempted administration or enforcement of rules and regulations promulgated by these bureaus.

That brings me to a discussion of a few of the provisions of codes to which I would like to make brief reference.

The first is that of maximum allowable concentrations of atmospheric contaminants. Maximum allowable concentrations have legal status in approximately 50% of the codes now effective; in the remaining codes they take the form of recommendations or suggested guides. Prior to the inclusion of such concentrations in a given code, it is submitted that a thorough study of plant conditions within the state should be conducted to determine the potential hazards in that plant and to ascertain whether or not it is reasonable and practicable for a given industry to comply with the proposed maximum. Bureaus of industrial hygiene should desire a reasonable and practicable code in the same manner that industry does. Furthermore, with respect to such permissible concentrations, it is submitted that it is unfair and unreasonable for one given sample to be taken and serve as the basis for an alleged violation. In this respect I am most critical of a number of the codes that are now effective because they do not establish the technique to determine concentrations or provide some average atmospheric condition existing over a period of the shift during which employees would be working. Fortunately we have had sane administration of the codes, but it is highly probable that at the instance of pressure groups industry may well be embarrassed by violations of these permissible concentrations and the cause of industrial hygiene thereby retarded. It is further submitted that the proposed maximum allowable concentrations should be subject to annual review, and the permissible limits adjusted in accordance with scientific research that may develop information as to proper standards.

The second subject embraces those provisions dealing with sanitation, safety, housekeeping, ventilation and illumination equipment. Examination of the various codes now effective will develop extensive differentials in the applicable provisions. It is submitted that these rules and regulations should take the form of recommendations rather than specific prohibition of given practices. The burden of compliance rests just as heavily upon the employee as upon the employer. In many instances, it is impossible for management to police plants for the purpose of compliance. For illustration, let us take a regulation that would require the use of respirators in any given operation. What is an employer to do today with the enforcement of a plant rule requiring an employee to wear his respirator? It is one matter for the health department to advise the employer to discharge an employee who refuses to comply with such a rule or regulation; it is another matter for the employer to deal with the union or employee in meting out punishment.

Again with respect to the general matter of housekeeping, the employer is dependent upon the cooperation of employees and the proper discharge of the duties that have been assigned to them. In my earlier remarks I made the statement that industry today is health conscious. I think it is fair to say that employers desire to operate clean plants and to maintain cleanliness and good housekeeping throughout those plants. This cannot be done without the full cooperation of the men who work on the job, and again management is unable effectively to enforce rules and regulations that bureaus of industrial hygiene might consider proper.

In conclusion, I trust that the foregoing discussion will bring to your attention some of the problems that are presented to management with respect to the establishment and administration of codes of industrial hygiene. I do not know whether the attainment of uniformity with respect to these codes is possible, but I feel certain that it is highly desirable. Your Conference is to be commended for its consideration of this problem, and I hope that you may make some authoritative recommendation about this. In my judgment, the inclusion of recommendations and information to serve as a guide for industry to comply with codes would materially assist bureaus of hygiene in their administration. Modern industry seeks to protect its employees from injury. By the cooperation of employers, employees and state officials administering these codes, that purpose should be possible of attainment.

Fiberglas Plastics

—Industrial Medical Aspects and Experiences—

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AS INDUSTRIAL physicians, regardless of whether we practice at one specific plant or as private practitioners taking care of illnesses and injuries arising in and out of gainful occupations, it is my feeling that we all should be aware of new processes and advances of our modern civilization and the concomitant occupational hazards which may occur.

We are all familiar with plastics as children's toys, handles on brushes, and other small fabricated items. In these plastics, chiefly condensation type resins, it is the plastic which dominates the picture, and the filler is secondary. However, in the new structure, Fiberglas plastic, which I am discussing, as pointed out by FRANK PRESTON, of Butler, Pennsylvania, at the Society of Plastics Industrial Meeting, 1944, the glass filler is the primary element and the plastic, although still vital, is a secondary portion. This change has given tremendous advantages to the new Fiberglas plastic, making it practically a perfect material.

As quoted in the *New Yorker* magazine by an enthusiastic representative of "Soyzic," the soybean plastic, when explaining to a potential user, "It is the perfect plastic at last; it can be bored, punched, stamped, sawed, and in an emergency, eaten with a light sauce." It is not felt that Fiberglas can be eaten, although certain experiments with powdered glass would indicate that ingestion could occur without harmful effects. As was brought out by W. G. HAZARD, at the Rhode Island Industrial Health Institute in 1943, the dangers of glass are often emotionally overrated. He brings it to our minds by the following statement: "People have a horror of being injured by glass. It seems deeply rooted. When we cut ourselves with a knife we think of the wound but when one is cut with a broken window we think of the glass." So serious were the problems connected with the rumors of sabotage of food by ground glass during the last war that experimenters in Richmond fed animals and themselves ground glass diets to see what would happen. Nothing other than slight reddening of the intestinal tracts of the dogs occurred. According to the above authority, no authentic cases of poisoning from eating glass among circus performers, babies, or anyone else were found at that time. So in this respect, Fiberglas does not have to bow to even "Soyzic," although it would be an unusual type of roughage.

It is my feeling that Fiberglas reinforced plastics denote a new era in industrial fabrication because of the following unique combinations of properties, qualities, and processing that set them apart from all other materials. Recent developments, as outlined by GAMES SLATER and H. W. COLLINS, presented at the Symposium of Materials & Construction at the annual meeting of the American Institute of Chemical Engineers, 1945, show that Fiberglas plastics laminates have an extremely high strength-weight ratio. The tensile strength of the individual fibers is on the order of 300,000 lbs. per square inch. This is three times the strength of piano wire per unit of weight and, depending on the fiber size, is approximately six times that of stainless steel. The glass fibers have a less than 3% elastic deformation factor, thus also providing an energy absorbent value several times that of steel.

Glass fibers, being inorganic, absorb no moisture and neither shrink nor swell in changing moisture conditions (which property also makes them most suitable for efficient surgical suture material). In addition, they possess a low coefficient of thermal expansion and the accuracy of dimensions of molded parts can be controlled with high precision. The directional properties of Fiberglas plastics are such that if stress occurs in several directions, it is possible to distribute the fibers in these directions in proportion to the amount of stress. Plastic laminates differ from metals in that the modulus of elasticity is controllable over a wide range. Since they have no definite yield point, it is possible to work the material very close to its ultimate strength without permanent deformation. This same characteristic prevents it from denting when struck a sharp blow. It does not propagate cracks. It does not rot, and retains its strength over a very wide range of temperatures. Since the fibers are composed of microscopic fine solid glass rods which are the end point of oxidation, they will exist indefinitely in an atmosphere of oxygen. It is water repellent and with certain coatings the wet strength can be made nearly equal to dry strength. It has high resistance to chemicals and electrolysis.

Because of the low or contact pressure resins used, substances can be molded in practically any desired shape merely by holding them in contact with the mold. This ease of fabrication eliminates the expense and physical limitations of high pressure presses, dies, and jigs and simplifies the cost of fabricating any parts, particularly those of large dimensions and those involving compound curves. As you are well aware, industrialists have a keen sense regarding the values of economical operations. The use of Fiberglas plastic laminates permits a frequency of design change which is uneconomical when there is a heavy investment in costly dies. They can be given a highly polished finish which becomes practically a part of the substance itself. It is a material with metal-like properties plus additional qualities. As competition becomes keener, and when the economic features involved in moving unnecessary weight become more clearly recognized, its light weight, with high structural strength, plus the other favorable factors previously mentioned, tend to make one feel that in the future it will be one of the most widely used processes known.

To describe in actuality its use in aircraft, which is our particular industry, the original form is made of a wood block, then a plaster of Paris cast is made of the wooden pattern. A slush molded core is lifted from the cast. This is used as a form on which the resin impregnated glass fabric is laminated just as we put a cast on a fractured extremity. The worker takes the pieces of fabric cut in suitable sizes and shapes and molds them with his fingers over the plaster cast, sometimes brushing on additional "goop," the plastic mixture. When this is finished, heat and pressure are applied by putting the intermediate product in a clear polyvinyl or cellophane vacuum bag, sealing, establishing a continuous vacuum, and applying heat in an oven at around 200°F. Upon removal, the plaster is knocked free and the formed part is ready to be machined, smoothed, and fitted to other parts of the assembly. Fitting together or repair of damaged laminates is done in the same fashion. "Curing" can even be done in the sun, thus putting the process in reach of the smallest manufacturers.

The possibilities of forming curves and also the lightness, yet great structural strength, which can be obtained, can be shown, for example, in car bumpers.

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These in the past have usually been made in three pieces which are later welded together because of defects of material fabrication involving metals and curves. According to some Fiberglas plastics tests, the three-piece metal bumper can be replaced by one of the same strength as metal, made all in one piece of Fiberglas plastic. Another illustration of the process which has been used medically and lies closer in our field is the molding of artificial limbs after first making a plaster cast. This provides a precision fitting custom-built prosthesis for the amputee and has many obvious advantages in addition to perfect fit—mainly light weight with great strength.

In our Shop 108, the Bench Shop, the majority of the parts made to date have been ducts, which use a number of compound curves where the qualities of heat resistance, high strength, and precision tolerance combined with light weight, workability, and impact strength, have been at a premium. The specific substances used consist of the Fiberglas fabric of a desired weight and weave plus a plastic mixture of copolymer resins. At the present time now being used are Plaskon and another liquid, Styrene. These are mixed with a catalyst, benzyl peroxide and tricresyl phosphate, 50% each, called Luperco ATC, a substance which must be handled carefully as it is inflammable below 100°F. Then are added two white powders, antimony oxide and chlorafin. Thorough mixing produces a white, viscous semifluid similar to Unna's boot material, suitable for smearing over the layers of fabric.

As to the problems associated with workers using these substances, the following are the facts that we have found and have substantiated in the literature.

Despite the fact that this is glass, which, in its shape as a string, can be used as a suture like silk or as a tracer string in surgical sponges, people suspect that the particles produced will injure them. Many of the personnel, when first exposed to the substance, develop a redness, itching, and swelling of the skin similar to allergy. Other workers are concerned about the particles causing lung damage and respiratory symptoms. A few are worried about ingestion, which has been covered previously. In the main, as far as these are concerned, the problem is one of educating the workers and, after a short time of using these substances, all except the skin phases seem satisfactorily cleared.

In the report of the Director of the Trudeau Foundation, 1941, LEROY U. GARDNER stated that exposure to the dust of glass wool involves no hazard to the lungs because the fibrous material is not inhalable. Apparently the tendency of the particles to form felt-like masses upon any object with which they come in contact probably prevents inhalation. At any rate to date, both in actual use and on experimental animals exposed for over a year in as high a concentration as could be maintained, no serious effects on the lungs have been found. In the cases we have examined we have found no lung pathology attributable to this substance. Despite this knowledge, when the finished product is machined adequate exhaust ventilation and respirators are used.

However, we found several problems, largely dermatitis. With the start of the new process, the safety and medical departments naturally became immediately concerned. After investigation and the institution of hygienic measures as proved necessary for observation, and by joint cooperation with supervision, we were able to bring conditions satisfactorily under control. At one time practically all of the 120 workers, split into three shifts, had mild irritations; particularly before a simple change in the method was instigated. When the workers were cutting the fabric material in a dry state, owing to the large number of particles produced, many developed contact dermatitis which appeared mainly on the hands and arms and, in some, around the neck. (Our experience closely paralleled that of SULZBERGER and BAER, as reported in INDUSTRIAL MEDICINE, October, 1942, "The Effects of Fiberglas on Animal and Human Skin"; and SCHWARTZ, in INDUSTRIAL MEDICINE, March, 1943, "Skin Hazards"; and SIEBERT, in INDUSTRIAL MEDICINE, January, 1942, "Fiberglas Health Hazard Investigation.")

Skin irritation was also evidenced and aggravated owing to the necessity of handling the materials with the bare hands and the frequent washings necessary to remove the plastic fluid from the skin. The small fibers of glass, although proved non-allergenic, seemed to be mechanical irritants and, in some cases, a sensitizer. With the continued use of the Fiberglas most of the workers become "hardened" and the temporary itching, swelling, and redness subsides. It is only the small percentage who seem to be allergic to the binder solution who require transfer to another shop. Reassurance and treatment with calamine lotion and phenol, plus the other protective measures instituted, handled 95% of the cases of temporary skin irritation.

Workers wear clothing loose at the neck and wrist, with long sleeves, and many prefer to wear gloves, either of rubber or cloth, with the fingertips cut out. By changing the process so that fabric pieces are moistened first with the binder before cutting, the number of particles and irritations have been markedly reduced, in comparison to when the pieces of fabric were cut dry, pasted on, then painted with the solution. The institution of additional washing facilities and instructions to the workers to wash copiously and carefully at rest periods, lunch periods, and before leaving for home, have aided in solving most cases. The substitution of Lan-O-Kleen, a non-abrasive lanolated cleansing agent, in this shop also aided materially. Protective sleeves are available but seem to provide no more benefits than long-sleeved clothing, except in the shop where the plaster is removed and the edges burred. Here the workers make protective sleeves out of the same clear material as the vacuum bags used in the ovens. Two types of liquid "invisible glove" material are available and used—Fend and Ply. As mentioned previously, when the finished product is machined, down-draft exhaust ventilation and respirators are used. When burring the edges, moistening with vaseline or wetting with water eliminates the small, glass rod-like particles. Supervision is unusually alert to detect early cases and have them report for treatment and observation at the medical stations.

In the year, however, there have been nine employees whose dermatitis has increased in severity, developing a weeping eczematoid type of dermatitis with which you are all familiar and which required that the employees transfer to other shops. These job changes have been successful in removing them from the irritating substances which were felt to be a combination of mechanical irritation and sensitization possibly to the ingredients in the plastic binder. The dermatitis was similar to classic contact dermatitis venenata with isolated or grouped papules, vesicles, or pustules occurring in uniform, multiform, or modified types upon a reddened infiltrated base. The lesions were accompanied by itching or burning sensations and resulted in weeping, crusting, infiltration, and scaling. In two of the cases of dermatitis found, one

was a scabies of long standing which responded slowly to therapy. The other was a coincidental tinea which cleared up rapidly upon treatment. Both of these, however, owing to the possible aggravating factors of the job, were also transferred and have not returned to this type of work.

The uncomplicated cases were treated by therapeutic transfers to other jobs and removal from the irritants, x-ray, aluminum subacetate, calamine lotion, and general supportive therapeutic measures. Recovery was complete in a short time in all cases.

IN SUMMARY, the uses of Fiberglas not only in plastics but also as an effective low weight insulating material and a substitute for fabrics—as well as its medical uses as a blood plasma filter, sugical suture material, bandages for burns in which one wishes to determine the nitrogen loss in the exudate, a tracer thread which is opaque to x-ray in surgical sponges, and as light-weight artificial limbs, make it imperative that industrial physicians be familiar with the substances used, the possible complications that can arise from their processing, and their comparative safety when properly controlled. The majority of cases of industrial medical significance are adequately handled by the hygienic measures outlined. In those few cases where "hardening" does not occur after a short period of observation, transfer is indicated. However, with the institution of measures such as proper clothing, protective sleeves, adequate washing, the moistening of the material before it is machined or cut, respirators, protective creams, gloves, the use of a soft lanolated soap, and sufficient washing facilities, as well as an alert, well informed medical and safety staff to indoctrinate the worker and the supervision, the problems connected with this relatively new industrial process can be reduced to the minimum.

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THE eighth annual meeting of The Ambulatory Fracture Association, will be held October 9, 10, and 11, 1947, at the Leland Hotel, Aurora, Illinois. The program will follow the usual pattern with the presentation of papers, case reviews, and operative and dry clinics. It will deal chiefly with fractures and traumatic injuries using the various types of internal and external skeletal fixation and other techniques employed in the treatment of fractures.

The Toxicity of 2-Nitropropane

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THE possible industrial use of nitroparaffins was first published by Hass *et al.*[1] in 1936. They described the excellent solvent properties of these substances and the relatively cheap raw materials required for their manufacture. Although they were first prepared in 1872, it was not until the development of a vapor-phase nitration method that these compounds could be produced from an alkyl halide and silver nitrate on a commercial scale.

Until the detailed study by Machle, Scott and Treon[2] was performed in 1940, only scattered reports are available concerning the toxicity of these compounds.[3,4,5,6] The work of Machle's group was supported to some extent by the manufacturer who supplied pure materials for his investigation. As a result of this work the authors concluded that nitroparaffins are toxic and precautions are necessary in their safe handling. They found that concentrations of 500 ppm of nitromethane and nitroethane were safe and tolerable for guinea pigs, rabbits and monkeys but that a concentration of 1000 ppm of nitromethane caused the death of a monkey and may be assumed to be dangerous to man. Their experiments indicated that the toxicity of the nitroparaffins increases with the size of the molecule. Hence nitropropane should be more toxic than nitromethane or nitroethane. Another important point brought out by their work is that lethal concentrations for animals were far below narcotic concentrations, thus indicating that there can be no warning from the beginning of narcosis.

In an excellent compilation of maximum allowable concentrations accompanied by a lengthy commentary, Cook[7] suggests 200 ppm as a maximum allowable concentration for nitromethane and for nitroethane. He suggests medical observation of workers exposed to these materials, especially if the concentrations to which they are exposed approach this value.

During the war on several occasions our Division encountered the use of 1-nitropropane, but this was used in small quantities with other solvents whose concentrations made them more important from an industrial hygiene standpoint. We recently had some limited experience with 2-nitropropane; and while our studies were not extensive, the information obtained is presented here with the thought that it will be of interest.

In one plant two workers were engaged in spraying battery cases and stacking them after they had been sprayed. The acid-proof lacquer used in the spraying contained approximately 20% 2-nitropropane. The spraying was performed in a small booth, adequately exhausted by our standards. Concentrations of 2-nitropropane in the sprayer's breathing zone varied between 10 and 25 ppm, while the concentration in the vicinity of the stacked cases was 30 ppm. The two men involved had performed these jobs for a year, and neither had noticed any ill effects. Their exposure did not exceed four hours in any day nor more than three days in a week.

In the second plant some five or six men including the employer had been engaged for varying periods of time in the dipping of small forms into a large tank of a vinyl co-polymer dissolved in a mixture of xylol and 2-nitropropane. The liquid was maintained at a

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temperature of 110-120° F, although during the dissolving process a temperature of 150° F was used. The work was done in a small building segregated from the rest of the plant, although some methyl ethyl ketone and cyclohexanone were in use in the shed on occasion. The ventilation equipment was makeshift and lacked effectiveness. Concentrations found in the workers' breathing zone varied from 20 to 45 ppm.

Some evidence of adverse effects on the workers was noted.

The two men having the longest experience and most intimate exposure to the 2-nitropropane presented the most severe symptoms. Although they came to work in the morning feeling well, after having eaten a full breakfast, by noontime anorexia and nausea were experienced, the symptoms being noticed earlier in the day when the weather was damp and natural ventilation at a minimum. As the day progressed, these symptoms grew worse and were followed by vomiting and diarrhea. They were unable to eat their suppers and vomited during the evening but were not prevented from sleeping. The following morning they would awake feeling well and would eat a hearty breakfast, only to have the cycle repeated. The foreman reported that several other men employed at this work had this same experience and severed their connections with the plant. One of the two workers noticed a lessening of diarrhea as he "hardened" to the exposure.

Three other men working in the same room did not experience nausea or vomiting but did suffer from severe occipital headaches which came on gradually during the day, were more severe late in the afternoon, and were experienced earlier on those days when the weather was damp. All these workers were completely symptom free on Sundays and on vacation. The substitution of methyl ethyl ketone for the 2-nitropropane brought about complete relief from all the symptoms described above.

Air samples were taken in the first plant by adsorption on silica gel, and analysis was made by a modification of the method of Scott and Treon.[8] In the second case the midget impinger was used employing isopropyl alcohol as the absorbent. Corrections in this case were made to allow for aeration losses as described by Elkins.[9]

While this experience is limited, there is no doubt in our minds that adverse effects were experienced by workers in the second plant upon continuous exposure to concentrations of 20-45 ppm. To the best of our knowledge these conditions were representative. Accordingly, we have set a tentative maximum allowable concentration of 25 ppm for 2-nitropropane pending more extensive knowledge of this material.

From a control standpoint we advocated two measures. The first was directed to the provision of adequate exhaust facilities, and the other was concerned with the substitution of a less toxic substance. This latter recommendation resulted in our being visited by a representative of the firm manufacturing these solvents. His claims were that the nitroparaffins were relatively harmless, and he quoted as his authority Bogin and Wampner.[10] A direct quotation from these authors, connected with the manufacturer, is of interest:

"A detailed study has been made of the toxicity of the nitroparaffins, and in this respect they are similar to the ester-type solvents of approximately equal vapor pressure. They therefore offer no unusual hazards, either with respect to toxicity or flammability. The ordinary percautions exercised in handling the common lacquer solvents are sufficient for the nitroparaffins."

Reference to the following tables will indicate to some degree the relative toxicities of the nitroparaffins and butyl acetate, the common ester-type solvent having a vapor pressure essentially the same as 2-nitropropane and only a little higher than 1-nitropropane. Values for the nitroparaffins are given by Machle *et al.*,[2] those for butyl acetate by Sayers, Schrenk and Patty[11] and those for carbon tetrachloride by Lehmann and Flury.[12]

CONCENTRATIONS REQUIRED TO KILL GUINEA PIGS

Substance	Time Exposed Hours	Concentration %	Mortality %
1-Nitropropane	3	0.5	100
Butyl Acetate	4	1.4	100
Nitromethane	12	0.25	50
Nitroethane	12	0.1	50
Butyl Acetate	13	0.7	0

CONCENTRATIONS REQUIRED TO KILL RABBITS

Substance	Time Exposed Hours	Concentration %	Mortality %
1-Nitropropane	3	0.5	100
Carbon Tetrachloride	3	0.32	100

While comparisons of toxicities in animal experiments can often lead to erroneous conclusions, the foregoing figures would tend to indicate that the nitroparaffins are more toxic than butyl acetate and correspond in some degree to carbon tetrachloride.

The authorities referred to by Bogin and Wampner include Hass *et al.*[1] who wrote primarily concerning the nitration process and incidentally interpreted Gibbs' and Reichert's[3] work in 1891 to indicate that nitromethane on injection is less toxic than 1-butanol. Hass *et al.* also concluded from some preliminary tests made by Henry F. Smyth, Jr., that the vapors are considerably les stoxic than benzene, aniline, carbon disulfide, carbon tetrachloride and nitrobenzene and that the nitroparaffins were safe to use in reasonable proportions in lacquers. Another authority referred to by Bogin and Wampner is rather hard to find, but after combing through the issue of *The Journal of Industrial Hygiene and Toxicology* cited, this sentence in an abstracted article seems to be their authority. "All volatile solvents (except water) used in the paint and varnish industry are poisonous when present in sufficient concentration in air."

The "detailed study" referred to by Bogin and Wampner, however, is that of Machle, Treon and Scott,[2] whose conclusions summarized at the beginning of this report indicated that the nitroparaffins are toxic and precautions are necessary in their handling. Does it not seem unreasonable for a concern to support an excellent piece of research and then allow misinterpretation of the results in this manner?

In summary, detailed animal experiments have indicated that the nitroparaffins are toxic and precautions are necessary in their safe handling. Experience with 2-nitropropane in one plant where two workers were exposed about one-quarter of their work-week to concentrations of 10-30 ppm resulted in no adverse effects. Five or six workers exposed daily to concentrations of 20-45 ppm resulted in severe headaches in those least exposed and anorexia, nausea, vomiting and diarrhea in those most intimately exposed. Until more is known definitely about the toxicity of 2-nitropropane, our Division is regarding 25 ppm as the maximum allowable concentration.

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Hazards in the Use of Mercury Compounds in Treating Seeds

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THE principal information which we have on this subject has already been given in an article published in the *Journal of Industrial Hygiene and Toxicology* for July, 1946.[1] Details of the treating process are given in that article and will only be briefly referred to here. Many types of seeds are treated to kill fungi and to prevent seed rotting or "damping off." Most of the products used for this purpose contain organic mercury compounds such as ethyl mercury phosphate, or chloride, or hydroxymercuric compounds mixed with some inert material such as starch or talc. This is applied by mechanical means in large quantities or is mixed with the seed in a drum or a can where smaller quantities are to be treated. In some cases the compounds are mixed with water and applied in liquid form. Many of these treating compounds are slowly volatile so that intimate mixing is not essential but complete disinfection takes place during storage.

Dermatitis may be produced by contact of the treating material with the skin. Dust produced during treating and bagging of the treated seed and the vapor given off during volatilization in the warehouse indicates the presence of a potential mercury hazard. However, to our knowledge, no cases of mercurialism as a result of seed treating have been reported except two involving diethyl mercury used to eradicate smut in wheat,[2] and several cases of mercury poisoning in the manufacture of seed treating compounds were reported by Hunter in England in 1940.[3] In a study made by the Kansas City Area Industrial Hygiene Service of the treatment of large quantities of seed corn, no measurable quantities of mercury were found around the treating operation or in the storage warehouse. Sampling was done in this case by means of the arge impinger using nitric acid as an absorbing medium. However, in this particular case exhaust ventilation was used at the bagging operation and the storage warehouse was well ventilated.

Since this article appeared there has been additional work on this problem. The seed treating operation was again studied using the photoelectric mercury vapor detector, and again gave negative results. At the request of the Industrial Hygiene Service, the U. S. Public Health Service made a brief laboratory investigation which showed that very little mercury vapor could be detected in the presence of several treating compounds held for 30 minutes at 55°C.

A recent paper in *Industrial & Engineering Chemistry* on "Mercurial Fungicide Wax Problems" indicated that the phenyl mercuric fungicides sublime rapidly at 105 to 125°C.[4] In this case measurements were made at intervals of the mercury content of waxes containing these fungicides.

An attempt was made by the Kansas City Area Industrial Hygiene Service to secure evidence of actual cases of damage to health from seed treating compounds. Inquiries were made at most of the seed handling companies in the Kansas City Area and at several large greenhouses. Only one plant in this area actually does seed treating and this was the plant previously studied and reported on. One other company stated that they knew of a case of dermatitis on the shoulder of a deliveryman, presumably from carrying sacks of treated grain. Workers in the one plant studied did report to us that they had received skin burns from this material. No cases of damage to health were found at any of the greenhouses. However, at the greenhouses where seeds were treated it was being done on such a small scale that any real hazard was extremely unlikely.

It has been reported to us that a study made in North Carolina did show a high concentration of mercury in a closed warehouse where sacks of treated grain were stored. Since the operation of seed treating is very widespread in agricultural areas it is probable that there is additional information on this in the files of some of the state industrial hygiene divisions.

Control measures recommended include exhaust ventilation, personal protective equipment, and good housekeeping. The plant in which we made our original investigation was using exhaust ventilation but it was of a rather makeshift type and considerable visible dust was present in the atmosphere and on the equipment around the bagging operation. Since that original investigation the plant has greatly improved the ventilation system, practically enclosing the bagging operation, applying the ventilation much more efficiently, and exhausting it outside the plant.

Respirators are recommended by the treating compound manufacturers although in some cases they state that a clean dry cloth may be used in place of a respirator. It seems apparent that no filter type respirator is wholly satisfactory against a material that volatilizes; and, in fact, an accumulation of dust on the filter may result in the worker breathing more volatile mercury than he would without the respirator. Also, where the respirators are hung about the room to accumulate dust they may cause skin burns about the face. Hence, the use of respirators is not desirable unless the plant undertakes a thorough program of respirator sanitation.

The most important factor in the entire control program is good housekeeping. The treating compound should be stored in an isolated, well-ventilated storage space or outside the building entirely. All spilled compound should be immediately cleaned up and the area around the bagging operation should be frequently cleaned of settled dust, preferably by vacuum cleaning. It would be well to remove such sweepings to the compound storage room until they can be safely disposed of. The seed storage warehouse should be well ventilated and the contents plainly labeled. Edible products must not be stored in same room. Good personal hygiene, including adequate sanitary facilities, is necessary for the prevention of dermatitis.

Presented at the Ninth Annual Meeting of the AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS, Buffalo, New York, April 28, 1947.

Further investigation of the seed treating problem is needed particularly along two lines: (1) search for additional cases of dermatitis or mercurialism wherever seed treating is done or treated material used; (2) a thorough laboratory study of the treating compounds themselves. There is reason to doubt whether the evidence obtained to date is sufficient to say that there is no health hazard in these operations, but a comprehensive laboratory study would assist greatly in giving evidence on this point. In the first place, there is considerable doubt whether the sampling methods used at present are capable of giving the information desired, since the mercury occurs not as elemental mercury vapor but rather in the form of oganic mercury compounds. We have been unable to determine whether any free mercury is formed during the volatilization process. Hence, the first information necessary is to determine the mechanism of volatilization and then to develop a suitable sampling procedure. Even where the material occurs in the form of dust, there is considerable difficulty in the analysis because these mercury compounds are hard to break down and exist mixed with a large amount of inert organic material.

Another needed laboratory investigation of great importance to this problem is that of determining the rate of volatilization of the compounds at various temperatures and their vapor pressures. This would be of considerable assistance in appraising the potential mercury hazard in closed warehouses.

While very little positive evidence of damage to the health of workers has been obtained in connection with seed treating, there is still a need for further investigation. Much treating is done on the farm in areas where occupational diseases are not reported. Also, inquiries at a number of seed houses indicated that many of them were interested in producing treated seeds but were holding back because they were afraid of the health hazards involved.

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Health Research in British Industry

RICHARD S. F. SCHILLING, M.D.,
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THERE is no doubt that much can be done to keep Britain's industrial workers healthy by enforcing the law which lays down standards for conditions of work in factories and mines. This is the task of government inspectors, helped by management and workers who now realize that it is in their interest to get rid of the bad working environment capable of giving rise to ill-health and hampering production. Many industrialists have come to realize that the law by itself is an insufficient measure of protection and cannot always be satisfactorily enforced by a few hundred inspectors whose visits must be brief and irregular. So industry has in many instances appointed its own industrial medical officers and nurses to help workers choose jobs for which they are physically suited, and to maintain their health at work, and to prevent and treat industrial injury and sickness. This has been achieved by pre-placement medical examinations, by paying attention to conditions of work, and by providing well-equipped ambulance rooms.

There are now some 1600 factories which are known to have their own medical services. Nevertheless there are more than a hundred times this number which have no such services. If Great Britain is to make fuller use of its manpower, and the need to do so is of paramount importance to its future prosperity, there must be a more comprehensive application of medical science to industry. It is not enough to appoint the general practitioner as an industrial medical officer unless he has been trained in this type of medical practice.

A knowledge of clinical medicine possessed by the general practitioner is obviously essential for placing workers in suitable jobs, for the rehabilitation of the injured and sick and for the detection of morbidity. But the industrial medical officer should also know something about factory sanitation, modern welfare amenities, the physiological and psychological problems of work, and about statistical methods. The medical officer needs the outlook of a biologist studying human life in its working environment, determining those factors associated with increased sickness and lessened efficiency, and eliminating them with the help of the engineer, the chemist, and the physicist.

The course of instruction outlined in the Regulations for the Diploma of Industrial Hygiene, recently initiated by the Conjoint Board of Royal Colleges of Physicians and Surgeons, provides an excellent framework for this training which universities must provide. There are now five British universities with departments of industrial hygiene and two of these, Manchester and Edinburgh, are offering courses for this diploma. There can be no doubt that other universities will follow suit or will encourage their departments of public health to train the future medical men and women of industry.

As a result of years of practice and research by factory inspectors, and by the investigations of state departments of industrial health, research and methods by which health is maintained and disease and injury prevented at work have been established. Research has been and will continue to be essential, for industry is never static. New processes and new methods of work are always being adopted, thus exposing the worker to unpredictable hazards. In the last 50 years factory inspectors have reduced the incidence of lead poisoning from over 1000 cases a year to less than 50. However it was not until 1915 that the British government first investigated scientifically and comprehensively the effects of conditions of work on general health, by appointing the Health of Munition Workers Committee. It was shown that for certain types of work long hours were both harmful and uneconomic. As a result of this Committee's recommendations the Industrial Fatigue Research Board was appointed to continue studies on similar lines when war had ceased. As hours of work were reduced in the inter-war period, it was found that the enormous expansion of repetitive work made demands more on temperament than on muscular strength. The field for research was gradually widened to include the investigation of boredom in relation to incentives and uniformity and variety of work. As fatigue was no longer the main problem for investigation this Board was logically renamed the Industrial Health Research Board. The latter Board is a Standing Committee of the Medical Research Council. This it advises and assists in promoting research into health problems among workers. Its members normally include an employer and a trade unionist

as well as scientists. The Medical Research Council and the Factory Inspectorate of the Ministry of Labor and National Service are mainly responsible for promoting industrial health research on behalf of the government.

During World War II the Medical Research Council developed a Department for Research in Industrial Medicine at the London Hospital, principally to investigate toxicological problems such as diseases of the lungs of foundry workers, the risks to health associated with the use of pneumatic tools and certain solvents used in the manufacture of aircraft. At Cambridge, a Unit of Applied Psychology was established to study problems such as the use of vocational tests in allocating men and women to skilled work and supervisory posts.

Since the end of the war the Medical Research Council have formed three more research units. There is now a team working in the heart of the South Wales coalfields at Cardiff investigating pulmonary disease of miners. It should be possible to state with confidence the levels of dust concentration which are not dangerous to health, and how dust may be reduced to safe concentrations, and what work outside the mines can be safely undertaken by miners already incapacitated by pneumokoniosis.

Another Research Unit has been formed in London to study methods of selecting and training building workers to play a full part in the urgent task of making good the shortage of houses. This shortage is due to the widespread destruction of dwellings by enemy action and to the fact that no new houses were built during the war. In Birmingham there is now a Department of Industrial Medical Research similar to the one at the London Hospital, investigating toxicological and accident hazards in industries in the midlands.

All the above research departments are financed entirely out of British government funds. Universities teaching industrial hygiene are also doing research. Any departments responsible for educating medical officers and others to play their part in keeping workers healthy cannot flourish without the stimulus of research. And it is right that particularly in this branch of social medicine in which there is still so much to be learned, research should not be the monopoly of government departments.

If the most important problems are to be investigated, and if unnecessary duplication of work is to be avoided, there should be a close link between state and university departments. It is to be hoped that this coordination of effort will be achieved as this work develops and its importance is more widely recognized.

The industrial medical officer attached to a firm is in a position to understand better than anyone else the health risks of his particular industry. He should be encouraged and helped to investigate his own problems and to make his results available to others by publication. Since 1944 the *British Journal of Industrial Medicine* has been published quarterly, and to it several medical officers in industry have contributed the results of original work.

Industrial health research differs in many respects from other forms of medical research. For its success both in obtaining and applying results it requires the cooperation of all sections of industry—employers, workers, chemists, engineers and social workers. Before any study can begin, management and workers have to be told all the facts about the investigation, and what is required of them. Almost all give their help, but there is still a long and unnecessary lag between result and application. It can be shortened by increasing the number of medical officers in industry who have been trained in preventive medicine and by research workers being more practical in their recommendations. There is an obvious place for the engineer trained in industrial hygiene in the research team and in the factory itself to make plans for improving both methods and conditions of work.

There must also be more attention given to the general education of management and workers so that they may realize that the biological and technical sciences can raise the level of output and promote health and happiness at work.

LETTERS TO THE EDITOR

Social Security

TO THE EDITOR: After reading your editorial in the July issue, I am wondering if the writer of "Let's Name Names" has been in contact with individuals benefiting from the Social Security Act. I have been interested in industrial medicine for many years. Since the Social Security Act became law, I find it much easier in dealing with employees over 65 years of age. It is also very heartening when catastrophe occurs owing to the death of a young supporter of a family. This type of benefit is what actually counts! —E. M. FEIMAN, M.D.

[Our objection to Social Security is *only* to the way it is financed. We are not alone; even Congress is interested in that.—ED.]

Seasonal Observation

TO THE EDITOR: Hay fever isn't contagious, and ordinarily no one dies of it, so the yearly cycle sneezes its merry round; the pollen count is a feature of the day's weather news; and a radio commentator remarks with a laugh that the President himself officially opened the season by throwing out the first box of Kleenex. Imagine, however, the influx into the doctors' offices under 'socialized medicine,' and the demands for hospitalization in nice, cool, air-conditioned rooms—all on the reasonable taxpayer basis that "It's paid for!" —INDIVIDUALIST.

"Oh, oh!"

TO THE EDITOR: The specialty of industrial medicine is responsible for having developed the longest word in the current edition of Webster's International Dictionary. The word is: pneumonoultramicroscopicsilicovolcanokoniosis. You might mention that this item of information was contributed by a friend of the publication who is addicted to sesquipedalianism. —C.E.D., M.D.

Pilfered Gag

TO THE EDITOR: Everybody turns to "Tonics and Sedatives" in *Journal of the American Medical Association.* In the issue of August 16, 1947, on page 46, that department leads off with "The Soulless Corporation—the story of a sad case sent by H.S.L." This "sad case" is merely the adaptation of an incident concerning a barrel and a rope which was originally and much more interestingly, described in a recent novel entitled "Lewd Moon." This is called to your attention for two reasons. One is that the author of "Lewd Moon," who writes under the pseudonym George Reeder, is somebody who is widely known for his identification with the field of industrial medicine. The other is that "Dr. Pepys," whose diary is usually a feature of "Tonics and Sedatives," and who often names the books he gallops through, referred to "Lewd Moon," in a recent *J.A.M.A.* as an attempt to imitate "Spoon River Anthology." In all fairness it would seem that the author of "Lewd Moon," having been accused of imitating where he wasn't, should at least be given the credit of having been original where he was. The story of the barrel is his. The fact remains, however, that "Lewd Moon" was obviously written, and is already recognized, as a book for the *discriminating* reader. . . . —INDIVIDUALIST.

[On behalf of George, we say "Thank you!" On our own behalf, let's hear more from "Individualist."—ED.]

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Industry's Responsibility

Fifteen years ago (in Industrial Medicine, 1:2, 118, November, 1932) there was an editorial commenting on the question asked at the end of an article entitled "How Far Shall the State Go?" The question was: "Whose responsibility is it to see that the physical and mental status of prospective employees is properly estimated, and the proper care provided for those who are unable to take care of themselves? Industry's or the state's—or both?"

The editorial said: "Analyzing this question from the non-medical and the non-'social' points of view, the physical and mental status of prospective employees *is* industry's responsibility—not as a matter of industry's obligation whatever it may be, to society as a whole, but only as a matter of industry's duty to itself. Economic considerations, self-preservation against the avalanche of claims based on job tenure, the mounting aggregate of compensation costs, the staggering expense of sicknesses, and the exigencies of the ancient law of the survival of the fittest which is the essence of a competitive status—all of these operate to require employers to make pre-employment determination of the physical condition of every one who, under the increasingly social tendencies of the times, is to be vested at the moment of hiring with any other rights than those involved in the exchange of work for wages and the receipt of wages for work. This responsibility of industry necessarily involves a pre-employment selection. The fit and the unfit, the qualified, the unqualified and the disqualified present themselves at the door to be hired. The fit and the qualified pass through; the unfit, the unqualified and the disqualified are turned back. This is 'a condition, not a theory.' And no social program or legislative enactment can make it otherwise. The question thus presents an opposition of separate ideas, because the necessity and inevitability of the selective process in taking on employees automatically limits industry's responsibility—in so far as prospective employees are concerned—to the selected group in point of quality, and to the period of employment in point of time. Industry thus has no individual or personal responsibility in this respect to those whom is does not or cannot employ. Whatever duty or responsibility it has to or for the prospective employees who cannot be hired is, therefore, not a matter of duty to these people individually, but only a matter of duty to the community or the state—the duty that involves the payment of taxes and other participation in an organized society. But the responsibility thus—by elimination—left to the community or the state for those who are unable to take care of themselves, is not untempered by alleviating circumstances. The very nature of the form of government of the community or the state is built around the principle that each individual belonging therein shall have the privilege of earning the living to which the social theorists would have us believe he or she is entitled. This freedom, however, involves the proposition that if the community or the state extends the privilege, the person to whom it is extended has a duty. That duty is to cooperate to keep himself or herself fit to earn a living. And both state and community have the legal, moral and social right to insist upon the performance of that duty by each individual. The question ('How Far Shall the State Go?') thus is rhetorical. The grammar purist might end it with a period. It is not intended to be answered. It *is* intended in this day of attempted departure from the standards of individual government and in this time of attempted invasion from abroad of the 'social' programs of certain decadent nations—to inspire sound thought on the proper function of government in matters of personal consequence as well as in matters purely political."

With all that has happened since 1932, it is still fundamental that "The very nature of the form of government of the community or the state is built around the principle that each individual belonging therein shall have the privilege of earning the living to which the social theorists would have us believe he or she is entitled. This freedom, however, involves the proposition that if the community or the state extends the privilege, the person to whom it is extended has a duty. *That duty is to cooperate to keep himself or herself fit to earn a living.*" It is also fundamental that "*. . . . both the state and the community have the legal, moral and social right to insist upon the performance of that duty by the individual.*" But there aren't any votes to be rallied in favor of duty, or insistence upon its performance. And so, as the commentator says (page 12), we shall soon be treated to "the glorious spectacle of playing politics with public health." Meanwhile, in spite of the insidious moves appearing every now and then toward non-occupational medical care by industry, the duty of industry is no more now than it was when the above editorial was written—nor will it be another 15 years from now. Somewhere along the line, however, it will presently *reappear* that the duty of the individual involves more than merely keeping himself fit to earn a living; he will also have to do enough work to *earn* it, politics and social theories notwithstanding.

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Industrial Hygiene

—Abstracts of Proceedings of Industrial Hygiene Section Meetings of the 74th Annual Meeting of the American Public Health Association, Cleveland, Ohio, November 12-14, 1946—

Reported by
C. O. SAPPINGTON, M.D., Dr.P.H.

DURING the four sessions of the Industrial Hygiene Section of the American Public Health Association, there was presented a great variety of subjects, including the Value of Industrial Hygiene—Education in Industrial Health—Lessons Learned in the Services—The National Workmen's Compensation Conference Committee—Union Contracts and Industrial Hygiene—Aviation Medicine is Industrial Hygiene—Problems in Industrial Hygiene Research—Benefits and Hazards of Nuclear Energy—Results of an Industrial Hygiene Survey in a Metropolitan Area—Community Health Program and the Industrial Worker—The Real Function of Standing Orders—Results of a Survey of Welders—An Improved Film-Monitoring Technique in the Evaluation of X-Ray Protection—Toxicity and Toxicology of Several Sulphur Compounds—Present Trends in the Enactment of Industrial Hygiene Codes—and Present Trends in Government Control of Occupational Diseases.

Tuesday, November 12

DR. T. LYLE HAZLETT ("The Value of Industrial Hygiene") gave the address of the Chairman of the Section.

Many sciences contribute to the well-being of our industrial population in the practice of hygiene as a branch of medical science relating to the preservation of health. The medical profession must accept the responsibility and be the guiding spirit in realizing the objective of prevention. However, there are three other distinct elements, engineering, chemistry and physics, which must be correlated.

One of the greatest advances during the war period was the use of job analysis methods, including a study of the chemistry of materials involved in the job and the engineering aspects of machines and operations; however, much remains to be done regarding the relationship of the worker to the job.

In accident prevention programs, one must recognize that the factor of the human element contributes very largely to the causes of accidents; this requires, therefore, a study of the human element and its relationship to the causes of industrial injuries and the close coordination of industrial hygiene personnel.

One of the outstanding accomplishments in the field of industrial hygiene during the war period was the work of McConnell, Flinn and Brandt in government-owned ordnance explosive plants in the control of occupational diseases. Despite the magnitude of explosives production, the total of 22 fatalities due to TNT, as reported, is but a small fraction of the 475 fatalities reported from the same causes and related compounds during the limited production of World War I.

Another instance of where industrial hygiene stood the test and was a great factor in the success of a project, is exemplified in the control methods which were used in the manufacturing, handling and processing of atomic bomb products.

The manufacture, testing and operation of various types of radar equipment involved numerous exposures to high frequency radiation. Extensive tests and examinations have indicated that these radiations have no harmful effects on persons other than the slight amount of heating which may occur; usually this effect is negligible and no particular hazard has been demonstrated.

Tangible profits which may result from industrial hygiene activities may be mentioned as follows: a reduction in absenteeism; diminution in the number of grievances presented by individual employees relative to working conditions; reduction of occupational disease claims; reduction of actual compensation costs through a reduction in accident frequency, and reduction in labor turnover. Intangible benefits occur, such as the improvement in general health as the result of periodic physical examinations and an extensive program of health education.

Even such a brief consideration of the subject suggests that there is an existing challenge to physicians, engineers, chemists, and physicists, upon whom falls the responsibilty of safeguarding the health of industrial workers; this challenge presents a new horizon and new frontiers in the field of preventive medicine in its broad aspects—and if met, we shall contribute greatly to the continuance of our American way of life.

DR. L. J. GOLDWATER ("Education in Industrial Health") summarized his subject as follows:

The impetus which industrial health activities received during World War II apparently is being maintained and there are definite indications that the trend will continue. From industry, official agencies and teaching institutions there is an increasing demand for personnel trained for industrial health work. Physicians, nurses, chemists and engineers are at a premium and many attractive jobs are going begging.

Early in the war, when the need for industrial health specialists became urgent, training facilities were set up to provide intensive courses for those in military service. At the present time the schools which might provide suitable instruction are reluctant to undertake the additional burden which such courses would entail. This reluctance is due (1) to the heavy demands being made by other public health students; (2) to the fact that no emergency such as that of a war now exists; and (3) to the feeling on the part of educators that intensive courses of six to 12 weeks are not adequate to train specialists for industrial health work.

Education in industrial health must be considered under several headings: medical students, health officers, physicians who intend to specialize in industrial health work, industrial nurses, industrial hygiene engineers, and industrial hygiene chemists. The time allowed in the medical school curriculum should be at least equivalent to that devoted to any of the other major medical sub-specialties. The health officer should be made familiar with the broader aspects of an industrial health program with emphasis on the administrative implications. The industrial physician should be trained in internal medicine, public health, organization and administration and have a dash of minor surgery. The nurses, engineers and chemists all require training in addition to that which is basic in their respective fields.

Two definite trends have recently become manifest in the field of industrial medicine. There is an increasing acceptance of industrial medicine not only as a specialty, but as a respectable specialty. This should result in an increasing number of physicians being attracted to the field. The second trend is an increasing emphasis on medical rather than surgical training for the industrial doctor. This calls for a changed perspective of the educational requirements.

DR. W. J. MCCONNELL ("Lessons Learned in the Services"), in the absence of DR. A. J. LANZA, summarized the experiences in the Army.

During World War II the Army operated more than 500 industrial plants employing well over a million workers at the peak of operations and the Surgeon General was charged with the responsibility for making all necessary provisions for the supervision of industrial hygiene and for the emergency treatment of military personnel and civilian employees at Army-operated industrial plants; and for establishment of proper standards of industrial hygiene in Army-owned contractor-operated munitions plants and for the necessary control and inspection to insure compliance with such standards. To accomplish these objectives, there was established in the Preventive Medicine Section of the Surgeon General's Office an Occupational Health Division charged with the responsibility for the Army Industrial Medical Program.

Owing to the special health problems associated with the manufacture and handling of explosives and the necessity for more closely coordinating the health and safety

programs in Ordnance facilities engaged in these operations, medical and industrial hygiene engineering personnel from the Army and from the U. S. Public Health Service were assigned as advisers to the Ordnance Department.

Though many of the workers in Army-operated plants were of necessity exposed to potential dangers and toxic materials and processes, the over-all health record was far better than that maintained in World War I—particularly in plants manufacturing explosives, chemical warfare materials, and the like.

Both medical officers and civilian physicians, together with civilian nurses and clerical assistants, were used to carry out the Army program, which included:

A. Adequate treatment and after-care of occupational injuries and diseases.

B. Adequate emergency treatment for non-occupational conditions on the job in order to keep the employees at work and reduce lost time.

C. Adequate supervision of the physical conditions of employees so that no worker was put to work on anything for which he was not fitted, and so that diseases arising out of working conditions might be detected.

D. Adequate supervision of working conditions to control health hazards and toxic exposures.

The Army Industrial Hygiene Laboratory was called upon to make periodic plant surveys in all Army-operated plants, and the Industrial Hygiene Division of the U. S. Public Health Service conducted similar surveys in the Army-owned contractor-operated plants. In privately owned plants having contracts with the Ordnance Department, the various State Industrial Hygiene Services were requested to conduct such surveys. In addition to the medical and industrial hygiene services made available to the individual plants, a number of research studies were conducted by the U. S. Public Health Service at the request of the Army.

PROFESSOR PHILIP DRINKER ("Health and Safety in Contract Shipyards during the War") included in the experiences of the Navy-Maritime Commission consideration of such subjects as medical care; physical examinations; sanitary inspections; protective equipment; ventilation; cleaning and degreasing; paint spraying; x-ray burns; accidents; and eye-flash.

In the summer of 1942 the Maritime Commission and the Navy, disturbed by the employment of many inexperienced workers, by high labor turnover, and other conditions, made accident and health surveys of representative yards. Existing safety provisions, medical facilities, sanitary provisions, and ventilation and air contamination were studied. After the reporting of results, a set of Minimum Requirements for Safety and Industrial Health in Contract Shipyards was prepared—these being accepted early in 1943. Offices were established and personnel selected at regional stations at Philadelphia, New Orleans, Oakland, and Chicago. These offices operated under a Chief Safety Consultant and Chief Health Consultant who reported to the Director of Shipyard Labor Relations of the Maritime Commission, and subsequently the Navy assigned specially trained officers, physicians, and industrial hygienists to this staff, supplementing this personnel by experienced civilian safety engineers. This work continued through V-J Day and then gradually was cut down and stopped entirely on October 1, 1945.

In medical care provisions, one physician was appointed for the first 5000 shipyard workers and an additional doctor for each 5000 thereafter; six full-time nurses were appointed to the dispensary for the first 5000 workers and three nurses for each additional 5000. Whenever employees on the swing and graveyard shifts were reduced, dispensary forces were reduced proportionately. First aid stations were manned by one nurse and so located that the worker would not have to go more than 400 yards to get emergency treatment. X-ray equipment was approved for yards employing more than 5000 workers and an ambulance for those having over 15,000. (In yards of all sizes it was common practice to use available automobiles for any but the seriously injured.) In most instances, the yards were near large cities, where existing medical and hospital facilities were used. In some instances, the providing of medical care for new inhabitants and families was accomplished by the building of good-sized communities and the use of medical insurance plans. Extensive employment of women on the west coast resulted in the development of a good-sized nursery and the addition of more pediatricians to the medical staff; arrangements were also made for prepared suppers which could be taken home, warmed and served.

Provisions were made for examination of new employees and placement, and check-up examinations of workers exposed to special risks; however, the demand for workers was so great and the labor shortage so acute, that the hiring examination was perfunctory in most cases—it was also forbidden on the west coast because of a labor contract so stating. In other areas, examinations were expected and often demanded by labor; however on the west coast the opposition was so strong that union officials kept the U. S. Public Health Service, Maritime Commission, and Navy from examining a selected group of shipyard workers as a part of a nationwide survey.

Cafeterias, water supply, sewerage, and waste disposal were inspected regularly. Mosquito control was a rather serious matter along the Gulf coast, not because of disease control, but because of genuine interference with work. Fly control in the main cafeterias and substations was frequently inadequate, except on the west coast. (It will be recalled that DDT for fly and mosquito control was not used on a large scale in civilian United States until the war was nearly over.)

In general, feeding arrangements constituted one of the most difficult problems; in some instances management ran the cafeteria and the sub-feeding stations—in others outside contractors provided food with the Maritime service keeping control over prices charged and profits made. The best food was provided in a small west coast yard, run by women as a sort of boarding-house.

Some yards prohibited the sale of milk in glass bottles because of breakage, and in others it was against security regulations for the workers to carry lunch pails or bottles of any kind of board ship; feeding, therefore, was arranged at substations nearby, where in some instances the food was surprisingly good and served hot.

The yards were required to stock standard articles of protection, such as welders' face shields, safety shoes, goggles, and the like; in general, equipment approved by a Federal agency such as the Bureau of Standards or Bureau of Mines was recommended. There were occasional shortages of hard hats, goggles, etc., which were sometimes serious, but probably the yards were no worse off than other government-operated defense plants. Protective equipment was supposed to be inspected and reissued only when properly reconditioned and sterilized; compliance varied greatly and depended mostly on the man in immediate charge.

Because shipyards were building everything from small boats to battleships, it was impossible to lay down ventilation rules applicable to all vessels. Welding and riveting were important operations and most of the welding was done electrically producing excessive heat and objectionable gases—therefore, the necessity for ventilation. Experimental work supplemented by abundant practical experience showed that satisfactory working conditions resulted when using about 400 cubic feet of air per minute per welder for general ventilation, or about 200 cubic feet of air per minute per welder when ventilation was obtained through local exhaust hoods held 8 or 10 inches from the work. In spite of obvious risks in welding in different types of operations, the over-all health record among welders was about the same as that for various other occupations in the shipyards, a fact abundantly confirmed by the detailed survey completed by the U. S. Public Health Service and to be reported by them in a special bulletin; out of the 4650 workers examined in yards scattered over the country, 3234 were welders, so that there is thus provided a very accurate picture of the effects, if any, welding has upon either the novice or the experienced welder.

Carbon tetrachloride was commonly used for cleaning

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installed machinery and usually was handled without any precautions. Some chemical manufacturers appealed to the Commission to have the practice curtailed. Chronic poisoning did not occur, so far as known, but there were some instances of acute poisoning scattered pretty well over the shipyards of the whole country.

Spray painting of outside parts of ships was commonly done all over the country; in one eastern yard management claimed the entire hull of a freighter could be spray painted in a day by two men, wearing air masks. Inside painting was done by hand because the paint vapors would otherwise have been too strong. Such operations gave no special trouble and have not resulted in any significant complaints or claims.

Precautions in the use of x-ray equipment were only obtained after some struggles with physicists in charge, as well as with management—this referred to examining castings and welds on high pressure lines by x-ray or radium. Insulating with fiberglas was awarded premium pay as being objectionable, without giving those in charge of health a chance to express opinion—this practice spread rapidly to all yards and the job was soon tagged as being unhealthy. It is well known through practical experience and much laboratory work that the handling of fiberglas causes no respiratory trouble, but will cause some skin irritation at times, particularly at the cuffs of the sleeves and around the neck—this soon disappears.

Accident rates were high in the early part of the war and gradually came down as the war closed, showing a frequency of 23.6 per million man hours, as compared with 43.0 in iron and steel foundries, 24 in building of tractors and agricultural machinery, 14.4 for automobiles, and 5.3 for explosives. Injuries to the lower extremities were more common than those to other parts of the body—head injuries accounted for about 21% of the total number of disabling injuries, of which about three-quarters were injuries to the eye; most of these could have been prevented if simple rules had been obeyed. Every large yard had a full-time safety man with additional personnel according to the size of the group; lectures, demonstrations, movies, talkies, and conferences with foremen were given fairly regularly, and safety educational material was brought into the training schools in each yard—still the accident rate was rather high when the yards closed.

A west coast yard with an excellent medical and safety department estimated that 40% of the dispensary calls were due to eye injuries, real or expected; most of such injuries resulted from foreign bodies, with a fair proportion being caused by eye-flash, as demonstrable conjunctivitis. The term "eye-flash" was a misnomer, but the meaning was clear and everyone knew what was meant, so the name stuck. Resulting injury is comparable to eye burns from direct sunlight, but such does not happen in a flash—it takes a considerable period of time unless the employee is a foot or two from the arc. Verhoeff and Bell showed that the biologic response varies inversely with the square of the distance from the source of radiation and directly with the time of exposure. Kinsey and Cogan in a series of experiments determined the combination of distance and time necessary to produce minimal ocular lesions in rabbits, dogs, and men. From the results of these studies, it is known that if a typical shipyard welding unit caused a just perceptible eye-flash in man, when viewed at 7 feet for 20 seconds, at 56 feet a comparable exposure would be $(56/7)^2$ times 20 seconds, or 21.3 minutes. The ultra-violet screening effect of ordinary glass and safety goggles is so good that eye-flash virtually is non-existent among workers who wear glasses. Because of the absence of customary lighting which ordinarily occurs in factories, colored goggles offered an annoying and sometimes serious risk of accidents—therefore no attempt was made to enforce widespread use of colored antiflash goggles, it being conceded that satisfactory compliance was obtained if ordinary goggles were worn, protecting against impact. Welders seldom got flash burns as the protection of the standard face shields, required under accepted codes, was satisfactory. Also flash burns coming from the side were extremely rare, but foreign body penetrations from the side were much too common; the use of safety goggles with side guards was therefore advised, but the enforcement of the recommendation left much to be desired.

DR. JAMES G. TOWNSEND ("Lessons Learned from the War") spoke from the experience of the U. S. Public Health Service.

Gains in various types of categories are evident; by 1940, the year defense activities began, there were 30 industrial hygiene units in 27 states; during the war years, 12 states and four localities established such services, and in a little more than a year since the war, two more states have set up divisions and two territories (Puerto Rico and Alaska) have signified their intention of doing so—the result being that industrial hygiene divisions are now in operation in 41 states, three territories, eight industrial cities and counties, and the District of Columbia. In 1941, states used more than $500,000 of the Social Security funds allotted to them for general health programs to support industrial hygiene activities—to this sum they added about $200,000 of their own. During the fiscal year 1947, almost three times as much Federal money is being spent for this purpose and the states have increased their expenditures fourfold. The result has been a coverage of workers increased from 40,000,000 previous to the war to 50,000,000 workers at present.

During the war eight state legislatures passed occupational disease laws, bringing total states in which such laws exist to 33; 16 states now provide full or blanket coverage and 32 states provide second-injury funds.

Technical gains have been accomplished in the use of wet dust filters in the explosives industry and the use of scavenging filters either of fiber or spun glass, in reducing the amount of explosive material conveyed through the dust systems; air, steam and water ejectors, although not ordinarily considered for use in exhaust systems, were also employed successfully. Traditional methods for the control of mercury vapor exposures have been revamped, especially with respect to sealing the surface of the floor, such as cementing linoleum over a contaminated floor and then varnishing or waxing, and adding extensive exhaust ventilation facilities especially designed. A principle of considerable importance is the ability of the advice of the industrial hygienist to be available in the so-called blue print stage, with the development of new materials and processes, thus saving much lost time in the production line and preventing trouble for industrial groups and technical advisers. New fungicides have been developed through tests performed for the armed services to determine skin-irritating properties of anti-mildews; dermatologists have also learned an important lesson about "hardening" among workers having dermatoses from occupationally-encountered chemicals. Other toxicological gains have been with reference to investigations of many solvents and plasticizers and metals introduced because of war shortages and emergencies, including investigations with respect to lead azide, beryllium, vanadium, tungsten, and molybdenum; a fire retardent paint containing antimony trioxide which proved to be innocuous; the welding of steel painted with zinc chromate paint does not produce hexavalent chromate fumes, and proof of the toxicity of stibine given off by storage batteries in submarines.

Demonstrations have been made through the Public Health Service, with the cooperation of the New York City Department of Health, the Division of Industrial Hygiene and Safety Standards of the New York Department of Labor, with respect to seven small plants in the Astoria area of Queens, showing that small plants can afford in-plant medical services. Other groups also had similar demonstrations under the auspices of the Chamber of Commerce in Williamsport, Philadelphia, Los Angeles, and Hartford, Connecticut.

Particularly noteworthy gains have been made in the fields of rehabilitation of handicapped workers, industrial ophthalmology, mental hygiene, and industrial dentistry. These developments have had a salutary effect upon the use of pre-placement examinations, such examinations becoming more what their name implies.

Gains have also been made in protecting industrial workers against the insecurity which results from non-

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occupational disability, recent trends indicating that organized labor and management are concerned with services of this type, although the pattern being followed for the most part at present, with few exceptions, is cash indemnification.

With all of the gains made, industrial hygiene still has a great deal of "unfinished business." Since American industry is never static, new processes, new methods, and whole new industries are constantly being introduced and industrial hygienists must be on guard for potential dangers which may occur. In conclusion, it is wise to point out that many of the gains made have come about as the result of cooperation and teamwork between all who are involved in the problem, public health officers, community health organizations, the professions, industrial employers and industrial workers themselves.

Wednesday Morning, November 13

WAYNE MERRICK ("National Conference Committee on Workmen's Compensation") summarized the history leading up to the formation of the committee and also briefly commented on the present and future status of the committee's work. A most important principle to keep in mind is that to give proper administration to the workmen's compensation laws, it is necessary for the administrators, members of the medical profession, and the compensation insurance carriers to work more closely together than ever before.

In September, 1944, a committee from the Council on Industrial Health of the American Medical Association met with a committee of the International Association of Industrial Accident Boards and Commissions and a committee of insurance carriers and self-insurers for the purpose of formulating plans for closer cooperation between the groups. In September, 1945, a meeting of the committees representing the three groups issued a report concerning the establishment of a National Conference Committee representing the three organizations; and a statement with respect to guiding principles, local organizations, report forms and statistics, administration, medical testimony, disability evaluation, selection of treating physicians, prompt payment of benefits, hearings and appeals, medical information, and rehabilitation.

This report was adopted as a working basis by the respective organizations. Later the formation of the National Conference Committee on Workmen's Compensation was completed and now consists of the following groups: Association of Casualty and Surety Executives; National Association of Mutual Casualty Companies, represented by the combined claims committees; International Association of Industrial Accident Boards and Commissions; Council on Industrial Health, American Medical Association; American Association of State Compensation Insurance Funds; Congress of Industrial Organizations; U. S. Chamber of Commerce; The National Association of Manufacturers; and the U. S. Division of Labor Standards, Department of Labor.

On May 30, 1946, the Executive Committee of the National Conference Committee on Workmen's Compensation held a meeting in Washington, D. C., and, from the list of the subjects mentioned previously, the Conference Committee selected five for immediate study and report by subcommittees. During the summer of 1946, the subcommittees assigned to study the subjects of Report Forms and Statistics, Medical Testimony, Disability Evaluation, Rehabilitation, and Hearings and Appeals, submitted preliminary reports in advance of the annual convention of the International Association of Industrial Accident Boards and Commissions in Portland, Oregon, which was held August 25-29, 1946. Continued studies will be made of the various subjects assigned to the subcommittees and final reports will be submitted.

BERNARD S. COLEMAN ("The Union Contract and Industrial Hygiene") compared the present status of union contracts with reference to health clauses and that of 20 years ago.

In recent years collective bargaining has played an important role in the development of group health insurance and sickness benefit programs. Examples of recent union agreements are those of the Amalgamated Clothing Workers and the United Retail, Wholesale and Department Store Employees Unions, administered jointly by employers and unions. Other examples not so recent are the International Ladies Garment Workers Union and the Hat, Cap and Millinery Workers Unions, which administer a fund made available by a gross payroll tax contributed by the employers. The Textile Workers, CIO, fund is employer-financed and administered by insurance companies.

The rapid movement of demands by unions for health and welfare service from employers does not, in the true sense, actually involve industrial hygiene, according to Dr. Leo Price, Director of the Union Health Center: "As far as unions are concerned, emphasis has been shifted from industrial hygiene to social security and health service for workers. All the union contracts in the garment industry which have secured a payroll tax levy, stipulate it should be spent for vacation benefits and health services such as medical care, sickness and hospitalization benefits and death benefits."

Examples of quotations from various provisions were given, particularly with reference to sanitation, physical examinations, plant safety committees, first aid, and control of hazards.

An industrialist recently stated: "In contract negotiations in recent years, the matter of so-called industrial hygiene or safety clauses has been discussed. In view of the health maintenance program and the extensive safety program in existence in all of our plants, and the record of performance which has been achieved as the result of these programs, our position in this respect is different from that which might be obtained in other industrial enterprises not having the same performance record. In the matter of industrial hygiene or accident prevention work, management, in the final analysis, is charged with the responsibility for the conditions which exist in an industrial enterprise. Accordingly, we believe that since the responsibility rests with management, the execution of such responsibility must also rest with management. On the other hand, this does not mean that we discourage interest on the part of our employees in making suggestions or taking an active part in making our plants safer and healthier places in which to work. In fact, the company's suggestion plan provides a means whereby employees may receive financial reward for making suggestions for the improvement of safe working conditions."

Within the past two decades, organized labor has taken an increased interest in industrial health services and, if this movement takes on the anticipated impetus, management will be compelled to pay more attention to the environment in which the employee works. Everything points to a more consummate effort on the part of management to introduce and maintain the most modern medical services that are attainable. Whether this will come as a result of the insistence of labor to include industrial hygiene clauses in the union agreement, whether it will come about by management's voluntary contribution, or whether it will result from mutual cooperation between management and labor, is of relative significance, but that management operations for effective production demand such consideration is the real crux in the development of adequate industrial medical services. Industrial hygienists, therefore, have a golden opportunity to enhance their field by enlisting the support of labor and to this end the union agreement can be an effective instrument.

BRIG. GENERAL EUGENE G. REINARTZ, U.S.A. (Ret) discussed the question "Is Aviation Medicine Industrial Hygiene?"—reviewing the history of aviation medicine since 1918 when it was first started. There were, as might be expected, a considerable number of problems and also a great amount of opposition. In spite of all this, aviation medicine was properly founded and later came to full fruition during World War II.

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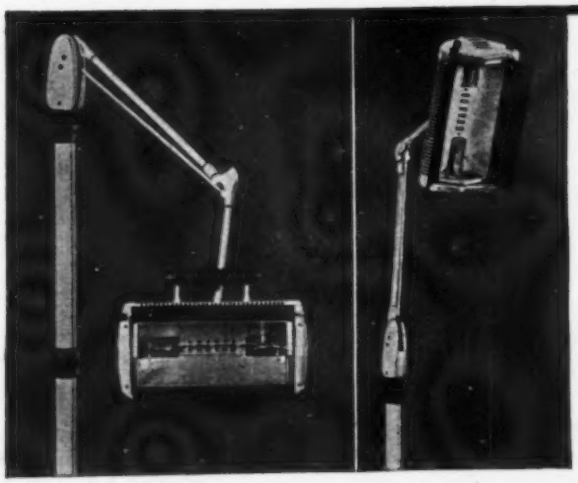

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Doctors were assigned to duty; they were graduate flight surgeons and indoctrinated in this work in the Army. Both civil airline executives and airplane manufacturers have realized the necessity for the effectiveness of aviation medicine in connection with those engaged in flying.

Aviation medicine is medicine in all of its phases applied to the art or profession of flying. In its application it transcends occupational medicine and industrial hygiene, as practiced; aviation medicine has a higher significance than these in that it encompasses both and goes farther, considering, as it does, the total personality of the flyer in any and all of the environments in which he finds himself, in the air, on the ground, at work, at play, and in his relaxations. It is a full-time job and those engaged in aviation medicine must be especially chosen, as not everyone who would practice this type of medicine is qualified.

At the Schools of Aviation Medicine of both the Army and the Navy, emphasis is laid on the selection of physicians who would become flight surgeons, this selection being made academically, militarily, physically, and psychologically. The Schools of Aviation are supplemented by their own well organized research laboratories, as well as by the Aero Medical Laboratories at Wright Field, Ohio, and Bethesda, Maryland.

Throughout the training of the pilot and his associates, they are kept constantly under observation and can at any time avail themselves of counsel and advice from the flight surgeon. Some of the problems encountered are instructions with respect to flight, protection in the arctic and in the tropics, training in rescue and survival, and many other similar varieties of complex situations. The flight surgeon is always on hand before the "takeoff" and is also present when the crews land.

The flight surgeon becomes one of the greatest morale builders in any air forces outfit, being continually consulted by the commanding officer and having direct entree to his office—this same procedure is carried on among the larger airlines where the senior aviation physician has direct approach to the president of the company.

Other problems which present themselves both to engineers and flight surgeons in their concerted efforts refer to the effects of decreased atmospheric pressure while flying at high altitudes, and diminution in the partial pressure of oxygen; the use of electrically-heated clothing; the illusions of the senses as related to difficulty in the internal ear; the effects of vibration, noise, speed, or noxious gases; and the problem of ejection of the pilot during emergencies. Research is now being conducted by aviation medical experts concerning the effects of cosmic rays.

The answer to the question "Is Aviation Medicine Industrial Hygiene?" must be stated, in the affirmative adding that it is industrial hygiene and more, since it goes farther and is broader in its concepts and certainly in its practices than is industrial hygiene. There is, therefore, much that industry at large may learn from the flight surgeon and from the principles and practices of aviation medicine—such may be well used as patterns in the solution of medical problems in industry.

DR. PAUL A. NEAL ("Next Steps in Industrial Hygiene Research") divided the different environmental factors with which industrial hygiene concerns itself at present, into four categories: (1) effects of physical factors, such as abnormal temperatures, humidities, pressures, noise, vibrations, etc., on the worker; (2) effects of posture, fatigue, rest pauses, physical fitness, infectious agents and susceptibility to disease, on the organic functions of the worker; (3) effects of gases, vapors, fumes and dust on the worker (toxicology); and (4) effects of radiations and nuclear particles on the worker.

Numbers 1 and 2 are usually discussed under the general term of environmental physiology. The body of knowledge needed is far from complete with reference to the effects of working demands on the human economy.

At present toxicology may be defined as the unfavorable effect of drugs and chemicals on the normal organism, in contrast to pharmacology which may be defined as the favorable effect of drugs and chemicals on the diseased organism. However, the interpretation of the word toxicology has been gradually changing over the past years, from the time it was devoted solely to the analysis of stomach contents of a person who had been suspected of being poisoned by some chemical. Through information concerning the gross action of many substances and combatting such effects, observations were made on workers in various types of industry; information was gained from field epidemiological studies; and now the establishment of the toxicity and potential dangers of new chemicals or old chemicals used in new processes, is such that safe medical and engineering controls may be used before workers are exposed. Such detailed research cannot be performed by a single individual but requires the teamwork of different types of specialists, such as pharmacologists, physiologists, biochemists, cytologists, enzymologists, and biophysicists.

It thus becomes important to find out how a toxic agent is metabolized, what its end products are, and where these chemical transformations take place. As an example, one may cite the studies done in Great Britain and in the United States on Lewisite, later leading to the establishment of a protective influence offered by BAL, whose usefulness in arsenical, as well as in mercury poisoning, is becoming well known. Another example of a thorough toxicological investigation was the studies on diisopropyl fluorophosphate, which it was found irreversibly destroys the enzyme choline esterase— there is also possibility here that fundamental studies of a toxic agent may disclose therapeutically useful properties.

Over the last generation sanitary engineers have provided us with safe milk and safe drinking water; it is going to be a problem of the immediate future to establish satisfactory safety standards for the air we breathe and to see that these standards are enforced. At present we know that "bad colds" are contagious and that in their transmission, the air we breathe plays an important part, but it remains for future research to determine how important this part is and its mechanism of transmission.

Recent developments in atomic energy have opened up possibilities for biological research that are difficult to overestimate; the public health aspects of these recent developments in nuclear energy may be considered under two general headings: (1) health physics or methods for the prevention of injury from radiations, and (2) the use of these new tools in biological research. With regard to the protection of the individual, it is imperative that the information at present available on medical and engineering control procedures be more definitely formulated and more generally distributed, supplemented by training of personnel in various disciplines in order that an integrated application of this knowledge be possible. At the present time it appears that the greatest contribution which the recent developments in nuclear energy can offer to toxicological and environmental physiological research is in the field of radioactive tracers. A better understanding of the hazards involved will demand a continuation of the study of practical problems in order that safe control procedures may be established.

A cooperative arrangement has been made between the National Institute of Health and the Clinton Laboratories, which will allow the National Institute of Health to utilize new tools, particularly high energy radiations and radioactive isotopes in present and future research programs, as well as to train personnel in the increasingly important field of personnel protection. A joint program is being developed by the National Bureau of Standards and the National Institute of Health which would establish in the Washington area a radiation laboratory, including pile facilities for fundamental research in the chemical, physical and biological aspects of high energy radiations.

Wednesday Afternoon, November 13

DR. ANDREW H. DOWDY ("Safe and Beneficial Utilization of Nuclear Energy") considered the radiation hazards of production, the chemical hazards of production, and the benefits of nuclear energy and its products.

With the discovery of nuclear fission and the production of nuclear energy on a large scale, the old hypothesis that matter is indestructible is no longer tenable—it is possible

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THROUGH experience gained in industry, it is becoming increasingly recognized that a daily dietary, though nutritionally fully adequate in its total values, may nevertheless not be conducive to optimal working efficiency and acuity. Faulty distribution of the food intake over the day is frequently the source of this failure.

The pernicious habit of skipping or skimping breakfast—encountered as frequently in men workers as in women—is considered to be the chief offender leading to impaired performance and lessened acuity during the morning hours. For this reason an adequate morning meal should be made a "must" for the industrial worker.

A basic breakfast pattern has been suggested to encourage better morning eating habits. Consisting of fruit, breakfast cereal (ready to eat or hot), milk, bread and butter, it assures nutritionally balanced composition and is easily augmented by the addition of other suitable foods. The cereal serving, consisting of cereal, milk, and sugar, is an important component of this breakfast, contributing biologically complete protein, B-complex and other vitamins, and essential minerals. The quantitative composition of 1 ounce of hot or ready-to-eat cereal* (whole grain, enriched or restored to whole grain values of thiamine, niacin and iron), 4 ounces of milk, and 1 teaspoonful of sugar is shown in this table:

CALORIES.....	202	PHOSPHORUS....	206 mg.
PROTEIN.....	7.1 Gm.	IRON.....	1.6 mg.
FAT.....	5.0 Gm.	THIAMINE.....	0.17 mg.
CARBOHYDRATE .	33.0 Gm.	RIBOFLAVIN.....	0.24 mg.
CALCIUM.....	156 mg.	NIACIN.....	1.4 mg.

**Composite average of all breakfast cereals on dry weight basis.*

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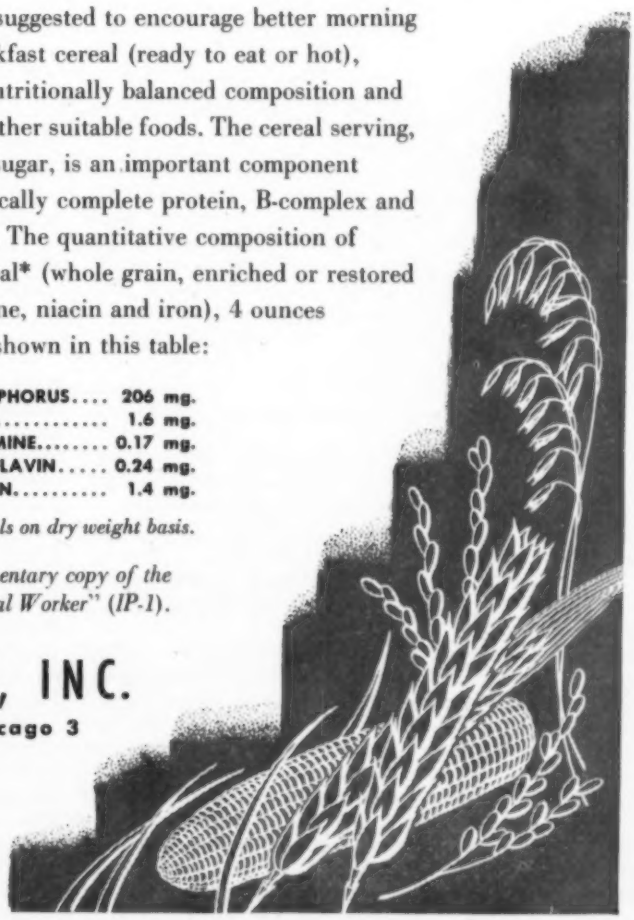

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to convert mass into energy and the latter may be dissipated in the performance of useful work or at a complete loss into the surrounding atmosphere. It is possible, however, to convert only a very small percent of the mass into energy—the best known yield of conversion of mass into energy is in the sun where it is approximately 1%, whereas in the case of uranium 235 the ratio of mass lost by fission to the original mass is approximately 0.10%. However, enormous amounts of power are made available by the conversion of mass into energy—for example, one kilogram of uranium 235 in undergoing fission loses one gram of mass and releases 25,000,000 kilowatt hours of energy. Although there is a vast quantity of potential nuclear energy which may be released from a naturally abundant occurring metal such as uranium, there are certain aspects relative to its production on a commercial basis which at present make its competition with energies derived from the combustion of oil, gas and coal prohibitive. However this does not mean that in the near future the situation may not be reversed. There are many scientific purposes to which the products of controlled nuclear energy can be and are being put at present and it is with the hazards of production of nuclear energy and the immediate utilization of its products that we are concerned.

Uranium occurs in nature admixed with small amounts of radium—during the separation and purification of the crude uranium ore there is a possible exposure to external radiation from alpha and beta particles and gamma rays. Radiation may arise from an external or internal source, the latter resulting from radioactive dusts, gases, or solutions which have gained access to the interior of the body through absorption by the skin, the lungs, or the gastrointestinal tract.

The neutron is a type of radiant energy, particulate in character, neutral in charge, and derived from the nucleus of the uranium 235 atom when it undergoes fission; during this process the uranium atom breaks into two fragments known as fission fragments, which vary in size, chemical composition, and degree of radioactivity—some are gases, others solids. In general, those in the ascendency have approximately one-half the atomic weight of the original uranium 235 atom. A neutron from a uranium 235 atom undergoing fission may be captured by an atom of uranium 238 which in turn transmutates into the radioactive element plutonium. Many other elements contained in the pile as impurities may likewise capture a neutron and transmutate into radioactive isotopes. It is thus seen that two different types of radioactive isotopes are formed in the pile, one by fission or uranium 235, and the other by neutron capture. Neutron capture may also give rise to release of radiant energy in the form of gamma rays. The isotopes, formed as a by-product of the pile, may emit beta particles, gamma rays, or both. The pile thus becomes a radiating source for large amounts of potentially dangerous radiant energy.

Gamma rays and neutrons are extremely penetrating and capable of producing profound and harmful biological changes. Injury may result from external beta radiation—here the damage is usually confined to the skin. It is doubtful if external radiation from alpha particles presents any hazard because of poor penetrating ability, most of these rays being stopped by the clothing or superficial layers of the skin.

Alpha, beta, and gamma radiations may result in serious damage once their parent source gains access to the interior of the body (internal radiation) through skin absorption, inhalation, or ingestion. The resultant injury is largely independent of the route of entry but directly dependent upon the type or character of the radioactive material, its distribution within the body, its storage, its rate of excretion, its half-life, and the amount of material involved. The toxicity of uranium per se, because of its low radioactivity, is chemical in nature and will be discussed later. The reverse is true of radium and the many radioactive fission products and isotopes.

Radium stored in the body can be detected by the presence of its gaseous decay product, radon. The presence of radium within the body in no way alters or changes its rate of decay. The gaseous radon establishes an equilibrium with the amount of radium contained within the body and is partially absorbed by the circulating blood and carried to the lungs where it is liberated with the expired air. A measurement of the amount of radon in the expired air of an individual is an index of the amount of radium contained in the body of that individual. The amount of radium which can be tolerated in the body because of its low rate of excretion, its high degree of radioactivity, and its long half-life (1590 years), is extremely small and has been considered to be not more than 0.1 mg.

All living cells, whether of man, animal, or plant, are capable of injury from these various types of radiant energy—but the degree and character of the biological changes resulting from irradiation are dependent upon many complicating factors and often subject to difficulties of interpretation. In man, the most sensitive tissues are the reproductive cells of the generative and hematopoietic systems; experimental work on laboratory animals has shown that the genetic mechanism is known to be susceptible to damage at relatively low dosages. The reproductive function may be temporarily decreased or interrupted, or permanent sterility may ensue. The circulating leucocytes and erythrocytes may be unaffected, slightly decreased, or depleted. As the degree of injury to the hematopoietic system increases, a profound leucopenia may result followed by a reduction in the number of platelets and red blood cells, with a concomitant fall in the hemoglobin. Should the amount of radiation be sufficient, the animal or individual may manifest cutaneous, subcutaneous and internal hemorrhages with bleeding from the body orifices, the latter indicating extensive injury and the individual may succumb from secondary infection. The bone marrow and lymph nodes in such instances may reveal almost complete destruction. Such a result may occur from repeated chronic irradiation or from a single severe exposure.

In considering the chemical hazards of production, we are principally concerned with the toxicity of uranium and its multiplicity of compounds including fluorides; although uranium is a weakly radioactive substance (alpha emitter), this particular property as such is of no practical importance as a radiation hazard, in comparison to its chemical toxicity. Because detection in body excreta generally depends upon its chemical rather than upon its radioactive properties, one of the first problems of the health groups was to develop a reliable quantitative method for its detection in very small amounts—enabling one to measure accurately one part in ten million in animal tissue, blood or urine. Another method makes it possible to detect very much smaller amounts, namely, one two-billionth of a gram.

Compounds may be encountered in the form of particulate dusts or gases, protection consisting in completely closed systems where possible, adequate circulation systems to evacuate the deleterious agents from the atmosphere, gas masks, and special procedures for laundering the work clothing of plant personnel. Personnel hygiene and rigid medical supervision to detect small amounts of noxious substances in the excreta of the personnel are important features of adequate health protection. Such a program will require many industrial physicians conversant with the clinical abnormalities likely to result from undue exposure to the chemicals involved and further, will require the utmost in cooperation among industries, industrial hygienists, radiobiologists, toxicologists, and scientists in general.

It is doubtful whether any other industrially hazardous chemical has had a comparable investigation, such as the toxicology of uranium and its various compounds. The results of these studies carried on by several medical groups are being assembled for publication. It is sufficient to say at this time that many of the uranium compounds may be absorbed into the body through the skin, by way of the lungs, or from the gastrointestinal tract by ingestion —uranium is primarily a nephrotoxic substance and is principally excreted through the kidneys.

Despite the urgencies of war, the operation of the Manhattan Project resulted in an enviable safety record for the undertaking as a whole—the hazards which have been

FIGURE 1 — Patient — thin type of build with beginning faulty body mechanics. The Camp adjustment provides a more stable pelvis, allowing patient to "draw in" the abdominal muscles thus gradually acquiring a gentle lumbar curve.

FIGURE 2 — Patient — intermediate type of build. Strain of lumbosacral joint predisposes to other strains. For protection of the joints in the lumbar region from recurrent strain and also as an aid in relieving the pain of acute conditions, Camp lumbosacral supports have proved effective.

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enumerated can be circumvented and in the conversion of this new industry to peacetime pursuits there should be no relaxation of protective measures.

The products of nuclear energy for peacetime purposes have been available since late summer 1946; to stimulate and encourage fundamental research in medicine, biology, chemistry, physics, and the other sciences, the Manhattan District at Oak Ridge, Tennessee, developed a program for the production and distribution of radioactive isotopes on a national scale. More than 50 radioactive isotopes are being produced by the uranium pile through neutron irradiation and fission processes for national distribution; between July 1 and September 30, 1946, more than 150 applications for isotopes were received and processed. During the year 1947 it is anticipated that the production of C 14 will be sufficient to supply the needs of most research workers presenting worthwhile problems.

A note of warning should be sounded in reference to the value of these radioactive isotopes as therapeutic agents—the most important and immediate value will be as an investigative tool, and the public must not expect an immediate cure for cancer per se—many unknown facts remain to be determined concerning the isolated cell and the organism as a whole relative to metabolism and physiology under normal and pathological states—the attack on cancer, therefore, must be both a direct and indirect one.

In addition to C 14 and H 3 which may help us to reveal many of nature's secrets, there are other radioactive isotopes which will probably prove to be important, such as sulphur, iodine, potassium, iron, arsenic and phosphorus. For example, a great deal of fundamental investigation has been done with radioactive iron to study anemic states and the formation of hemoglobin, as well as the body's reserve of iron; the body needs for potassium and sodium have been studied by use of radioactive isotopes of these elements; radioactive phosphorus is potentially a useful agent for the treatment of polycythemia and the leukemias; radioactive iodine seems promising in the treatment of selected cases of hyperthyroidism and a certain small percentage of cancers of the thyroid.

Probably many scientists in the next few years will attempt to find or will attempt to synthesize chemicals having a toxicity for certain cancer cells and a high predilection of absorption by those same cells in contrast to cells of the normal body tissues. Should such a compound be discovered, the next logical step would be to select a radioactive isotope having the proper half-life and energy values and synthesize it into the compound. By so doing, the cancer could be attacked both by chemical toxin and an internal radiation limited primarily to the site or sites involved by the cancer tissue—such a possibility is not an idle dream, but its realization may be somewhat delayed. The real solution for the cancer problem does not lie in its surgical and radiation treatment; rather does it lie in discovering the fundamental principle or principles wherein a healthy cell escapes its normal growth restraints and disregards its function as a serviceable unit of the whole.

DR. ROBERT H. FLINN ("Results of an Industrial Hygiene Survey in a Metropolitan Area") reported on the industrial hygiene part of the Chicago-Cook County Health Survey, which included consideration of 9000 of the 13,000 plants in the Chicago-Cook County Area.

The report was based upon information from 1399 industrial establishments, employing 594,445 workers. Practically no plants with less than 1000 employees had a full-time physician, and only two plants with less than 100 employees had part-time physicians. About 600 other plants had one or more on-call physicians, but this service was often limited to treatment of injuries. Half of the plants had no arrangement at all for physicians' services.

The proportion of workers having access to physician's services was more favorable, however, as the relatively few large plants employed a much larger proportion of workers. In small plants of 100 workers or less, the regular services of physicians were practically non-existent (0.3%), whereas in plants above this size, full-time services were available to 32.7% of employees and part-time services to 54.4%.

Only 238 (17%) of the reporting plants employed registered nurses, the total number being 556—but almost half these nurses were in the 33 largest plants. Twelve other plants employed part-time nurses with a total of 24 part-time nurses in both groups. About three-fourths of the plants had no provision for industrial nursing services. Full-time nursing services were available to 76.8% of employees in plants with over 100 persons and to practically none (0.3%) in small plants.

The services of dentists were provided only in larger plants (over 100 employees), to 1.6% of employees on a full-time basis and 5.5% on a part-time basis.

The services of industrial hygiene engineers or industrial hygienists were reported as available in larger plants on a full-time basis to 3% of employees and on a part-time basis to 2.7%, there being practically no services of this kind in small plants.

In small plants of 100 employees or less, a very small proportion of workers received physical examinations for proper placement (24%); periodic physical examinations (8%); x-ray examinations (10%); tuberculosis surveys (6%); blood tests (13%); dental examinations (2%); eye tests (6%); medical advice after examinations (7%); health education (3%); visiting nurse services (3%); plant health inspections by the plant physician (4%); and food service (7%). Treatment of occupational injuries was available to 84% of employees and treatment of minor ailments to 39% of employees in small plants, usually at a neighborhood physician's office. Accident records and illness records were maintained for 74% and 22% respectively, of employees in small plants.

It is thus evident that employees in small plants of 100 employees or less receive almost no industrial medical services except those relating to treatment of plant injuries. With increasing size of plants, however, more and more services were usually available, as the report shows.

Plants reporting to the survey had group life insurance plans for 56% of employees, group health insurance or sickness benefits for 50%, and group hospital expense plans for 58%. These total figures were favorably influenced by the larger plants, as the proportion of workers protected by group health insurance, for example, increased from 8% in the smallest plants up to 59% in plants of over 2,500 employees. Plants employing about 10% of all employees in the survey failed to indicate the proportion of their employees so protected, and are, therefore, not included in the total figures given above. There were no pre-paid medical care plans reported, except provisions for the cost of medical expenses in some commercial insurance policies.

The results of visits to 143 representative plants to obtain additional information are described in the report. Very few of these plants kept adequate records of sickness absenteeism, and health educational activities were extremely limited. Visits were also made to 24 very large plants with full-time medical services. These revealed a wide range of industrial health services varying from a fairly complete program to little more than a service for physical examinations and treatment of plant injuries, the latter being largely due to lack of personnel. The majority of these plants, however, provided many of the recommended medical and health services, but were quite limited in the health educational activities and in the use of sickness records to minimize illness.

HEIDE HENRIKSEN, R.N. ("The Public Health Nurse's Interest in and Contribution to the Health and Welfare of Industrial Workers") summarized this subject:

In Minnesota, public health nurses in community health programs support a statewide program for the protection of workers. This program consists of (1) safe emergency care of all workers; (2) safe work environment; (3) sound placement of workers with respect to physical capacities; and (4) maximum use of community health facilities for all workers. Some of the health programs in industrial plants are part of larger programs in which the Red Cross and the Division of Industrial Health of the State Department of Health cooperate.

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small industrial plants in urban areas. The nurses work part-time in various plants. A school program and a community program may be carried out in such centers in close connection with the program that is centered in an industrial plant where a large proportion of the population is employed. The public health nurse should be able to demonstrate to management and to labor that her services are an asset to the community.

DR. IRVING TABERSHAW ("The Real Functions of Standing Orders") defined a standing order as an order for some form of treatment, medication, or procedure to be carried out by a nurse in the absence of a doctor. To be valid, the order must be written, signed by a doctor and applicable to a specific patient or situation. Such orders are of particular value in a hospital where they are useful in providing for standardized procedures and in expediting care and treatment of patients in the temporary absence of the doctor. If carefully examined, standing orders in recognized hospitals will be found to consist only of the usual techniques which a nurse is qualified to perform and to apply only to those situations which require neither diagnosis nor prescription on the part of the nurse. All patients admitted to a hospital, except for emergencies, will have been seen by a physician who has diagnosed the condition and referred the patient for hospitalization. In doubtful situations and emergencies an intern or resident physician is usually called for diagnosis and treatment, thereby relieving the nurse of these functions. The standing orders of a staff doctor, therefore, merely serve as a guide for nursing routine to be carried out in his absence on patients whose condition he has diagnosed. They define what the nurse is permitted to do and what the doctor would be certain to approve of, and accept responsibility for, in his absence.

The problem of standing orders for nurses who see patients before a doctor is available for diagnosis and prescription is different. Visiting nurses are frequently called upon to give treatment in a home before a physician arrives and have adopted standing orders to cover such situations. These orders are not commonly formulated by a medical advisory committee of their public health organizations and are very limited. They frequently do not even permit a visiting nurse to carry out, without a doctor's order, a procedure which could be classified as an ordinary home remedy. The attitude of public health organizations is correct since they wish to protect the nurse from practicing medicine and realize that not only is the nurse not licensed or capable of practicing medicine, but also they do not have the authority to permit her to do so.

An analogous situation exists in industrial medicine where nurses are frequently called upon to work without any or with inadequate medical supervision. In 1932, the Wisconsin State Medical Society issued "Suggestions for the Guidance of the Nurse in Industry." In 1943, the Council on Industrial Health of the American Medical Association issued "Standing Orders for Nurses in Industry." In the latter bulletin it was suggested that where nurses are working without adequate medical supervision, written orders be requested from the Committee on Industrial Health of the local or state medical society. Industrial nurses have welcomed these orders and their organizations consider it an evasion of responsibility on the part of a physician who refuses to sign standing orders for his nurse. The majority of industrial nurses maintain that it gives them legal protection, greater prestige, and a greater elasticity of function. These are not the basic functions of standing orders, however, and they do not provide these benefits unless they limit the nurse to nursing practice and truly represent medical supervision in the absence of the doctor.

Field experiences in industrial medical departments of many sizes and types in various parts of the country show that the real function of standing orders is not always understood by management, by the majority of nurses and by many doctors. Generally, two types of interpretation are placed upon their function. One is that the purpose is to give the nurse more leeway than she normally should have, and standing orders really represent permission to

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practice medicine (orders have been observed where the doctor has given permission to his nurse to diagnose, treat and even suture in his absence). The second type of interpretation is that the orders are a device to limit the nurse from doing anything but the simplest first aid and record keeping. A nurse working under such standing orders is reduced to the status of a record clerk and first aider who refers everything to the physician. The most extreme example observed of this type was one in which a plant nurse (who was registered and qualified) was instructed in case of doubt to call the physician's office, where in his absence, she would receive instructions from his office nurse.

One function of standing orders is to cover those minor injuries or illnesses which do not need the services of a doctor. Another function of standing orders is to cover the gap between the initiation of treatment and the visit of the doctor. A third function is to provide standard acceptable procedure for the treatment of patients with injuries and illnesses which occur frequently in industry. These orders must be created by a doctor, who is not only responsible for the plant medical department but who is also responsible for the diagnosis of injured or ill workers who are treated by the nurse. The standing orders that insist that everything be referred to the doctor do not represent their true function. These orders do not recognize that the nurse is a professionally qualified person who is able to recognize symptoms and signs and to apply nursing procedures which may be effective in safeguarding the life and health of the patient.

To understand the real function of standing orders it is necessary clearly to differentiate between a standing order for treatment as opposed to the so-called standing orders on procedures. The Council on Industrial Health of the American Medical Association, while calling its bulletin "Standing Orders for Nurses," actually promulgated a guide for nursing procedure on injuries and illness that may occur within a plant. Such guides on procedures very properly can be issued by medical organizations interested in the field. Real standing orders, however, refer to the treatment of specific cases and can be written only by a doctor who actively and personally is in charge of a dispensary and has the opportunity to see the patient. The "on-call" doctor who is not given direct responsibility for treatment of the cases cannot really write standing orders that are valid, but can approve only a guide to procedure. The nurse in industry cannot use standing orders from such a doctor as a substitute for medical supervision.

In conclusion, standing orders are meaningful and exercise their true function only when they represent medical supervision in the doctor's absence. Standing orders are not a substitute for medicine and cannot replace the doctor in industry. The practice of industrial medicine will advance when all concerned, management, the industrial physician and the industrial nurse, recognize this fact.

Thursday, November 14

DR. W. C. DREESSEN ("Health Survey of Shipyard Welders") gave a preliminary report on this subject.

The principal objective of this study was to determine so far as possible the clinical nature of the acute respiratory symptom complex which was said to be occurring in arc welders; its prevalence, its causes, and its prevention. The purpose of the present report was to present in summary the principal findings of the clinical and environmental investigation carried out cooperatively by the U. S. Public Health Service, U. S. Navy and the Maritime Commission.

The seven shipyards selected for medical study were widely distributed geographically, representing locations on the Atlantic, Pacific and Gulf Coasts. Climatic conditions ranged from extreme summer heat to freezing winter temperatures. Physical examinations were made of 4650 individuals, including 2950 males and 1700 females. In selecting workers for the examination, a sampling method was used which was designed to secure the representative cross-section of the various welding crafts, shifts and working locations. Approximately 13% of the total male

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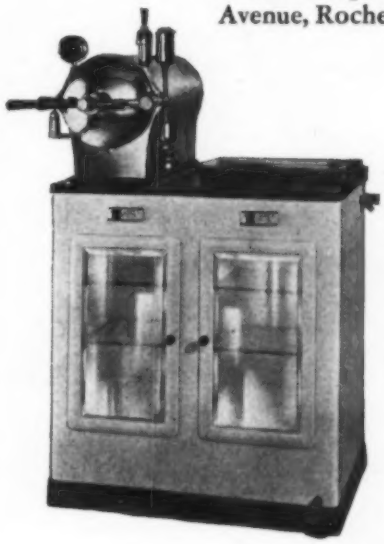

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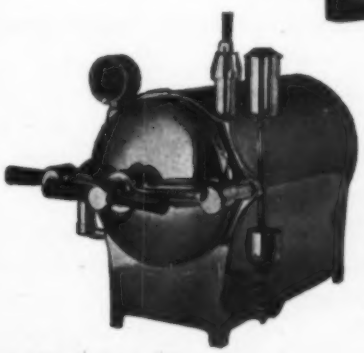

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welders and 20% of the total female welders working in the seven yards at the time of the study were included in the sample.

The record of each person examined included the following information: present occupation, occupational history, present working conditions, living arrangements, habits, previous illnesses, and present complaints. A menstrual history was secured from each woman. A physical examination was performed, with especial attention to the respiratory system. Laboratory procedures for each worker included a chest x-ray film; determination of the volume of packed red blood cells, hemoglobin, methemoglobin and the erythrocyte sedimentation rate; a blood test for syphilis; and urinalyses for sugar and albumin. Electrocardiograms were taken when indicated.

Fume samples were collected near breathing level with a specially adapted precipitator and were analyzed at the National Institute of Health for iron and total fume. Oxides of nitrogen were obtained at the same time by means of gas sampling tubes and examined at a laboratory near the field operations.

In the environmental studies, iron and total fume determinations were made in 1767 welding fume samples taken in eight shipyards including the seven where medical studies were carried out. Zinc and lead analyses were made on 278 and 25 of these samples, respectively. The highest average iron and total fume concentrations were found, as was to be expected, in the most confined welding locations; several locations provided a zinc concentration in excess of 12 milligrams per cubic meter (or 15 milligrams per cubic meter expressed as zinc oxide). Iron fume concentrations in excess of 20 milligrams of iron per cubic meter (30 milligrams per cubic meter expressed as ferric oxide) were found in all welding locations. Excessive amounts of iron were contained in from 6% of all the samples in the pipe shop to 43.5% in the hull inner bottoms. The analysis of all the welding fume samples brought out the following approximate composition of the fume produced from welding on bare steel with coated electrodes: ferric oxide, 50%; titanium dioxide, 15%; silica, 8%; and a mixture of acid-soluble metals such as magnesium, calcium, aluminum, manganese, chromium, copper and sodium, 24%.

More than half the gas samples from seven shipyards were found to contain less than five parts per million of nitrogen oxides. The highest proportion of samples exceeding 25 parts per million of nitrogen oxides was 10.4% on the sub-assembly inner bottoms, followed by 5.8% on the top deck and outside shell of the hull; and 4.5% in the pipe shop. Less than 1% of the samples exceeded 25 parts per million in the fore- and after-peaks of the hull and the sub-assembly, in the superstructures and the flat sheets of the sub-assembly, and in the fabrication shop. In no location did the mean for the nitrogen oxides samples reach as much as nine parts per million.

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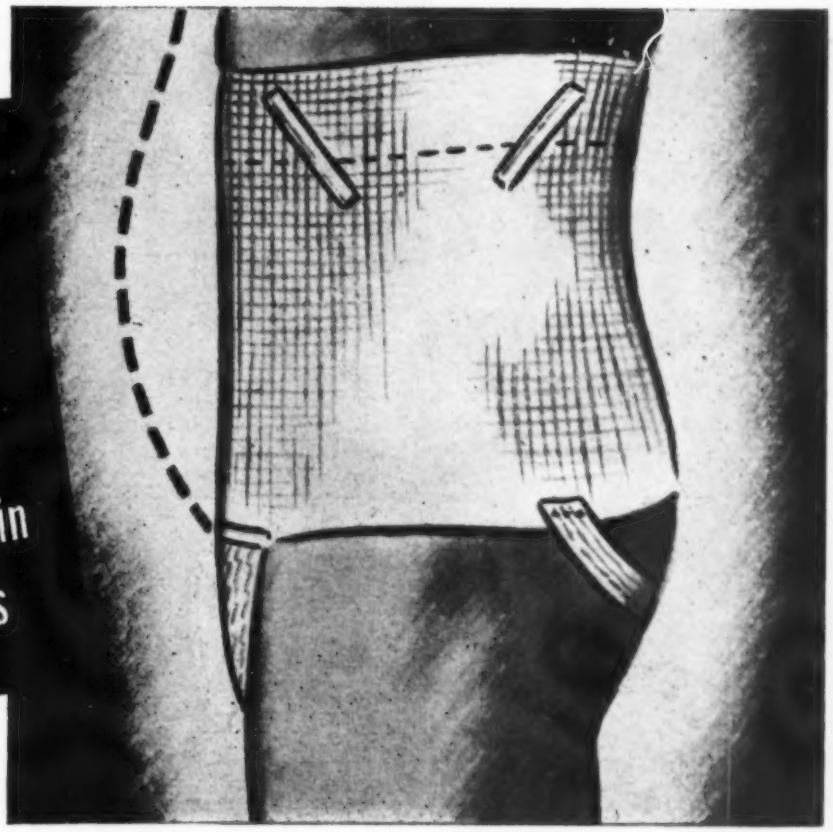

1 Poor posture

2 Relief of back strain

3 Relief of functional gastric disturbances due to ptosis of the abdominal organs

4 Post-operative support

5 Retention of post-operative dressings—particularly colostomies, varicocele

6 Retention of dressing for pilonidal cysts

7 Diastasis recti

8 Supportive treatment of abdominal hernia

9 Hypotension due to splanchnic pooling

10 Obesity

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Johnson's BACK PLASTER

tabulations, it was noted that the rates for each condition listed were higher among males than among females, except for overweight and headache. It was also shown that if a relatively high percent of welders are positive for a certain condition, the percent positive among nonwelders is also high. Welders of both sexes, however, showed slightly higher rates for upper respiratory syndrome, moderate or marked pharyngeal irritation, congested nasal mucous membrane, headache, heat rash, and perforated ear drums. The differences between welders and nonwelders of each sex with respect to the anemic syndrome were negligible. Conditions which were of higher frequency among the nonwelders than welders, or which were of the same frequency, included exaggerated lung field markings, musculoskeletal defects, gastro-intestinal symptoms, and acne.

It may be concluded, based on the observations of this study, that welding of mild steel as practiced in Maritime and certain Navy-contract shipyards induces an upper respiratory symptom complex and other possibly related changes such as siderosis and a slightly lowered blood pressure. It would seem that these alterations as demonstrated statistically are of clinical importance so far as temporary disability, differential diagnosis, treatment and prognosis are concerned; the observations, however, indicate that these changes have not led to permanent disabling residual effects. Safety in the form of eye and skin protection and ventilating practices undoubtedly have aided materially in keeping all industrially-related clinical findings at low levels of significance.

DR. ROY M. SEIDEMAN ("An Improved Film-Monitoring Technic for the Evaluation of X-Ray Exposure") briefed the steps in the technic:

1. Medium-speed dental film placed in a film holder enclosed by a thin moisture-proof material transparent to x-rays, and upon the "tube side" of which is superimposed a metal tablet of 0.0, 0.2 mm. Cu, 0.5 mm. Cu plus 0.5 mm. Pb, and 1 mm. Pb, the latter thickness of Pb folded over the back of the film and through which three apertures approximately 0.60, 0.95 and 1.70 mm. in diameter respectively have been drilled, are worn by x-ray personnel or posted at various places in the vicinity of radiologic equipment for 10 to 15 working days.

2. The test films accompanied by an exposure log including dates film worn or posted, number of work days and total exposures, type of equipment, average range of technic (KvP, MA, time), and, if film is worn—radiation history and blood examination findings, are mailed to the central laboratory for processing.

3. Laboratory x-ray equipment is used for the derivation of a "characteristic curve" representative of the specific film sensitivity and development conditions. A film (control) of the same batch and emulsion number as that of the test film, and a condenser r-meter (pencil type) are placed upon a Pb square of 2 mm. thickness at a normal o to the aperture of the x-ray tube. A copper stair tablet of 10 thicknesses ranging from 0.0, 0.1, 0.2, ... 1.0 mm. is placed on the film. A lateral ⅓ of the tablet is covered by a Pb shield 1 mm. thick; an exposure in r's as measured by a condenser r-meter is made. The strip of Pb is then removed and placed over the contralateral ⅓ of the tablet, and a duplicate exposure is made.

4. The control and text films are developed simultaneously with agitation in any suitable developer and the processing finished as usual.

5. The density values of the control film are read with a densitometer and, plotted directly as *density vs. filter thickness curves*, curve 1x being equivalent to the average of the densities determined in that part of the film receiving a single exposure and curve 2x representing the densities determined in that part of the film receiving the two exposures.

6. From an arbitrary density value on either curve, density increments or decrements, are determined by doubling (2x) or halving (1x) the intensity (exposure). A "characteristic curve," *density vs. log intensity (exposure)* is thereby derived graphically.

7. From density values (D) obtained under steps 0.0

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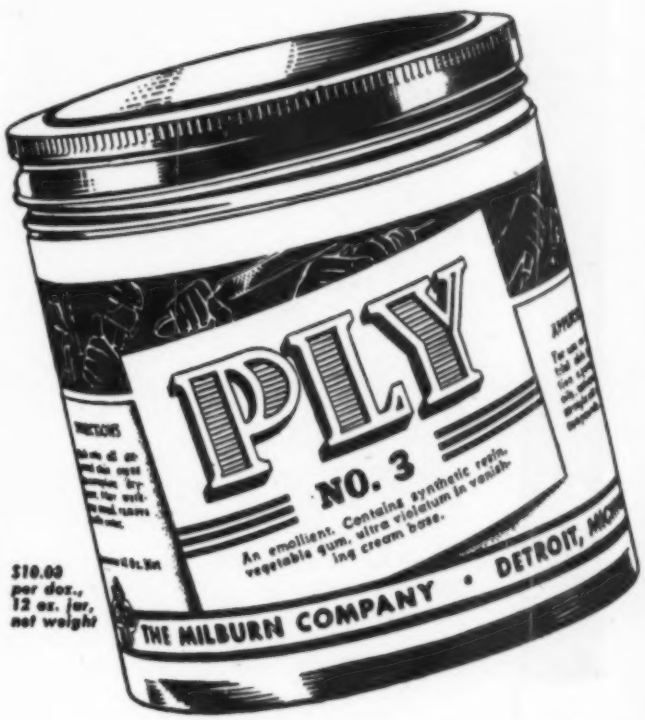
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Cleaner preliminary handling, and 90% delivery of the original plaster to the cast. Because the high-grade plaster-of-Paris used is bonded in a hard coating to starch-free Ostic Crinoline, little plaster is lost in wetting and handling.

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Because of the great strength of Curity Ostic Plaster Bandages and Splints, you have greater assurance against cast breakage—or if you wish, you can make casts of the usual strength with fewer bandages. The Curity Deodorizing Bandage effectively eliminates cast odors—from drainage or perspiration—in the Orr treatment and in lengthy therapy.

Try the Curity Ostic Plaster Line—for *any* type of cast.

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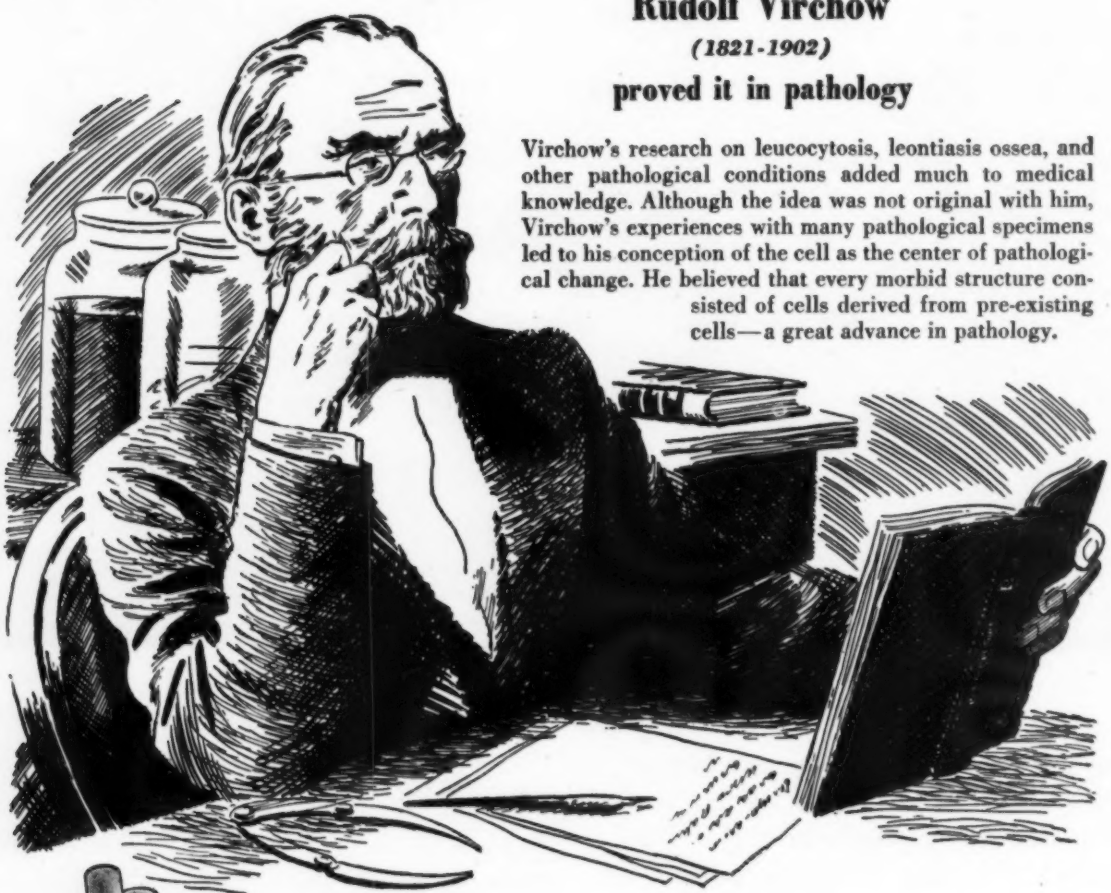
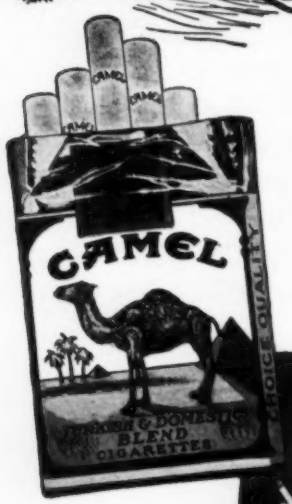
Experience is the Best Teacher

Rudolf Virchow
(1821-1902)
proved it in pathology



Virchow's research on leucocytosis, leontiasis ossea, and other pathological conditions added much to medical knowledge. Although the idea was not original with him, Virchow's experiences with many pathological specimens led to his conception of the cell as the center of pathological change. He believed that every morbid structure consisted of cells derived from pre-existing cells—a great advance in pathology.



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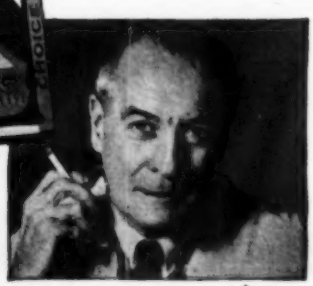
EXPERIENCE during the wartime shortage taught smokers the differences in cigarette quality. Millions of people smoked more different brands then than they would normally have tried in years. More smokers came to prefer Camels as a result of that experience, so that today more people are smoking Camels than ever before.

But, no matter how great the demand, we don't tamper with Camel quality. Only choice tobaccos, properly aged, and blended in the time-honored Camel way, are used in Camels.



According to a recent Nationwide survey:

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and 0.2 mm. Cu in the control and test films the corresponding relative log exposure values Y0.0. and Y 0.2 are determined from the "characteristic curve."

8. Let Y0.0 of the control film equal Ys, Y0.0 of the test film equal Yx, and S the dosage in r to which the control film is exposed. If the quality of the radiation to which the control and test films are exposed is the same, and, if the angle of incidence is normal in both exposures, then the intensity or exposure (X) in roentgen equivalents received by the test film is calculated by the formula:

$$X = S\ [\text{Antilog}\ (Yx - Ys)].$$

9. If the angle of incidence is normal for both exposures, an index of the quality of the radiation (PQI) received by the films, is derived from the formula:

$$\text{PQI equals } \frac{0.06}{Y0.0 - Y0.2} \text{ wherein}$$

0.06 = log 2 (0.30) x 0.2 (thickness of Cu under which a density (D0.2) equivalent to a relative log intensity (exposure) of Y0.2 is obtained;) Y0.0 = relative log exposure for D0.0 obtained from unfiltered radiation (0.0) thickness of Cu; and Y0.2 = relative log exposure for D0.2 obtained under 0.2 mm. Cu.

The formula assumes that the radiation is monochromatic.

10. If the PQI of the radiation received by the test film at normal incidence is different from that of the control film (standard beam), then a correction coefficient for quality (Cq) is applied to derive X. Cq is determined experimentally by simultaneous exposure of film and an r-meter to radiations of varying PQI, and is based on the dosage required to produce the same film density as that produced by a known dosage of radiation, the PQI of which is accepted as a standard. Thus, if the angle of incidence is normal,

$$X = S\ [\text{Antilog}\ (Yx - Ys)] \times Cq.$$

11. The angle of incidence of radiation received by the test film is approximated from the number of dots (areas of blackening) under 1 mm. Pb, through which apertures were drilled, the diameters of which were so chosen that their images would disappear at 30°, 45°, and 60° angles from normal incidence. The correction factors to be applied to PQI (Qo) and to dose (Co) are derived experimentally by simultaneous exposure of film under the test tablet and an r-meter at varying angles from normal to a control beam (standard) of radiation of a known PQI and dosage in r.

12. Thus, photographic quality of radiation received by the test film equals

$$\text{PQI} = \frac{0.06}{Y0.0 - Y0.2} \times Qo, \text{ and}$$

exposure in roentgen equivalents equals

$$X = S\ [\text{Antilog}\ (Yx - Ys)] \times Cq \times Co.$$

The dose so obtained is integrated for time, and compared with the permissible daily dose—0.1 r.

DR. HEINRICH BRIEGER ("Toxicity and Toxicology of Several Accelerators Used in the Rubber Industry") summarized his report as follows:

This preliminary report deals with four dithicarbamic acid derivatives: tetramethylthiuram disulfide, tetraethylthiuram disulfide, zinc dimethyldithiocarbamate and zinc diethyldithiocarbamate. The LD 50 in rabbits is shown in the following table:

COMPOUND	LD 50 gm/kg
Tetramethylthiuram Disulfide	0.21
Tetraethylthiuram Disulfide	2.05
Zinc Dimethyldithiocarbamate	0.40
Zinc Diethyldithiocarbamate	0.57

Ingestion of high doses of tetramethylthiuram disulfide and tetraethylthiuram disulfide produced definite and mostly advanced degenerative changes in liver and kidneys, while inflammatory changes were less marked and not regular. Very high doses of tetraethylthiuram disulfide produced excessive leukopenia or aleukia, with very marked hypoplasia or aplasia of the bone marrow. On account of the higher toxicity, tetramethylthiuram disulfide could not be given in correspondingly high doses, but there was also evidence of a trend of leukopenia in rabbits poisoned by high doses of tetramethylthiuram disulfide. The lymphocytes were affected predominantly, and the lymph follicles of the spleen were found hypotrophic. With lower doses, rather a lymphocytosis and hyperplasia of the lymph follicles were observed.

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Octin is an antispasmodic with both neurotropic and musculotropic action indicated for the treatment of smooth muscle spasm, particularly in spastic conditions of the genitourinary and gastrointestinal tracts. It acts promptly and the relaxation usually lasts three to five hours.

DOSE: Orally, one tablet (2 grains Octin mucate) every three to five hours.

Intramuscularly, ½ to 1 cc. (1 cc. ampule, 0.1 Gm., Octin HCl.) every three to four hours.

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The thymol turbidity test was positive in most of the severely poisoned animals; urea nitrogen was increased occasionally.

Experiments with intraperitoneal injections of the thiurams in mazola oil proved to be an impractical procedure. Experiments with inhalation are in progress.

Only 9% of the men examined showed a primary skin irritation, and this irritation was only minimal. Whether there occurs sensitization remains doubtful since the few positive retests may have been caused by perspiration. Perspiration may also explain the fact that, in contrast to our test results, occurrence of skin irritation is quite general in industry.

This experimental study is being continued and completed.

WILLIAM P. YANT ("Present Trends in the Enactment of Industrial Hygiene Codes") said that this subject, like the bachelor's children, would be all right in some places, but in other places the less said the better.

J. J. Bloomfield's definition of industrial hygiene codes was cited and briefly discussed. There is no debate as to the usefulness of the codes. Fifty-two industrial hygiene units have the power to make such regulations, and 35 have industrial hygiene codes. Powers of enforcement are also granted legislatively in some instances. Each one of these codes, however, should have appeal provisions, this being one of the defects in most instances.

About half of the codes which show maximum allowable concentrations provisions have a legal status and the rest are suggestive.

Among the weaknesses of the present codes is the division of authority—about half having no guiding principles as to compliance or provisions for material assistance to employers in complying with the provisions of these codes. The American Conference of Governmental Hygienists, however, is at the present time studying an ideal form of code arrangement, which should be of considerable assistance in the formation of new codes or in the revision of old ones.

Industrial hygiene codes should state clearly what the objective is, should make concrete recommendations for compliance, should be clear as to authority granted, as to penalty, and should make provisions for revision at stated intervals—they should also harmonize with existing safety codes. All of these subjects present knotty problems.

The expression "maximum allowable concentrations" is an unfortunate one and there has been a gradual evolution of proceeding from the principles of toxicity to the principles of comfort. In setting up provisions for concentrations, a great deal of flexibility must be allowed and provision must be made for safety factors.

Greatly needed are adequate laboratory investigations associated with good clinical experience which will demonstrate the desirability of specific provisions.

There is a really hard job ahead with reference to industrial hygiene codes; one must have great respect for good practices, and simple recommendations must be expeditiously secured; this will necessitate much study and also there must be good unanimity; in the meantime industry should be kept informed.

KENNETH M. MORSE ("Present Trends in Government Control of Occupational Disease") stated that governmental trends in almost any program are influenced by trends of nongovernmental groups—therefore any discussion of postwar trends on the part of government should be prefaced by those of the other equally important groups, namely labor and management.

During the war, great activity was evidenced by labor in occupational disease control; health was a common topic in grievances, with the result that contract negotiations frequently resulted in demands for health programs. The postwar period has seen little retrogression from this

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policy but rather increasing interest on the part of labor.

There are also significant indications of the increased interest of management in industrial hygiene; the war developed an awareness of health not previously indicated. There thus appears to be an increased interest on the part of management for the development of some type of a medically-supervised health program with part-time physicians.

The governmental trends can be divided into legal, as shown by compensation laws and/or health codes; and service or enforcement agencies.

As of June 1, 1946, 33 states and the District of Columbia provided compensation for occupation illness; 16 states and the District of Columbia provided this under a general coverage provision, whereas 17 states provided compensation under a schedule system. Increased benefits under these laws have also been a tendency.

The development of industrial health codes has received a great deal of attention during the past several years. This is a desirable activity since it defines the legal liability of industry and provides both labor and industry with a guide for good health practices. One of the most significant developments in codes promulgation is the recent Federal Mine Safety Code enacted by Congress—this action on the part of Congress recognizes a long discussed inadequacy of State codes. However this code was possible in the coal industry only through the temporary nationalization of the mines, a trend which is not by any means expected to develop in this country with regard to other industries.

Preventive services have been established and have been expanded under the sponsorship of the Division of Industrial Hygiene of the U. S. Public Health Service and the supervision of industrial hygiene units in states and other locations—altogether there are 50 active industrial hygiene units and two in the making—only two of these units are in State Labor Departments, the others being in State or local Health Departments.

These represent a nucleus of preventive health services in every industrial area of the country. The job of adequate coverage has been well done, the problem now being adequate staff and sound development.

Governmental activities at the Federal level have been expressed through the U. S. Public Health Service, the U. S. Bureau of Mines, and the U. S. Department of Labor. The Division of Industrial Hygiene of the U. S. Public Health Service has never been a regulatory group, but rather a service and investigative agency, a good deal of our present knowledge, concepts and procedures having stemmed from this organization. The research activities of the Pittsburgh Experiment Station of the U. S. Bureau of Mines has performed valuable authoritative work on methods for the collection and measurement of atmospheric contaminants and in the devising of instruments for their collection; one of its most important contributions has been its standardization and testing of respiratory protective devices. The U. S. Department of Labor, through its Division of Labor Standards, has been interested in the field of occupational disease control—primarily in the promotion of legislation for the control of occupational health hazards, and in the field of occupational disease compensation through various state labor departments and industrial commissions.

In conclusion, the postwar period will likely produce a greatly increased activity in occupational disease control as conducted by labor, industry, and government. Labor appears to evidence a trend for vigorous demands for healthful working environments in collective bargaining and in state legislative action. Industry is also developing a trend toward greater participation and has already shown disposition to accept the principles of development of some type of medically-supervised health service. Considerable governmental action is contemplated with increased activity in occupational disease laws and in the liberalization of benefits. Considerable interest is also manifested in the enactment of industrial hygiene codes.

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Gynecological and Obstetrical Problems of the Industrial Physician

MAX R. BURNELL, M.D., F.A.C.S.,
Flint, Michigan

THE PRESENT-DAY industrial physician is charged with the responsibility of inaugurating health maintenance programs which will aid in the reduction of lost time resulting from illness. That such programs should be the chief concern of those physicians specializing in this field of medicine is proved by the fact that the larger corporations who keep accurate records of sick absenteeism report that of every 100 days lost by the employee from illness or accident, only six of these days can be charged to an occupational cause; 94 of the 100 days lost are the result of *non-occupational* illness or accident.

Until recently, these health maintenance programs have been concerned mainly with such obviously disabling diseases as tuberculosis, syphilis, the common cold, digestive diseases, malnutrition, nervous and mental disorders, cardiovascular-renal disease, et cetera. With the enormous increase in the number of women employed during the war years, and at present with their largest peacetime employment, an added responsibility comes to the industrial physician—the establishment of a health maintenance program that will aid in the reduction of sick absenteeism resulting from illness peculiar to this group.

The problems that women bring to industry cannot be dismissed by stating that there are no widespread occupational diseases peculiar to women, nor that the high absenteeism rates of female employees are the result of their attempt at carrying on two jobs —the one in the factory, the other in maintaining the home.

In a recent study made by a large industry operating in 36 states, the disability rate for female employees was 292 per 1,000. These statistics covered illnesses lasting longer than one week. Gynecological disease, including acute appendicitis, accounted for 26% of that total. During this same period, pregnancy was responsible for an absenteeism rate of 45 per 1,000.

The industrial physician has found that the gynecological conditions most frequently brought to his attention and most commonly associated by the employee with her work are low back pain, dysmenorrhea, amenorrhea, excessive or intermenstrual bleeding, pelvic pain, the aggravation of symptoms of the menopause and pelvic relaxations (cystocele, rectocele and prolapse of the uterus).

What are his responsibilities in these cases, and what can he do in outlining a health maintenance program that will aid in their solution?

PRE-EMPLOYMENT Gynecological Considerations: During the pre-employment physical examination, a knowledge of the previous health of the prospective employee is basic in evaluating the ability of that individual to do safely the job to which she has been assigned. It is of extreme importance to know whether there have been disabilities arising from dysmenorrhea, pelvic pain, repeated abortions, excessive menstrual flow or intermenstrual bleeding, etc. It is just as basic that a pelvic examination should follow in the completion of such an evaluation.

X-ray of the chest, visual acuity tests, blood pressure readings, urine examinations and serological tests have become standard procedures in the pre-employment examination. Knowledge of any pathological state of the employee's pelvic organs is just as significant.

The importance of such knowledge becomes apparent when we study the trend of legislation relative to compensable occupational disease. Today,

Presented at the first annual Michigan Postgraduate Clinical Institute, Detroit, March 12, 1947; published in *J. Michigan State Med. Soc.*, 46:555-558, May, 1947.

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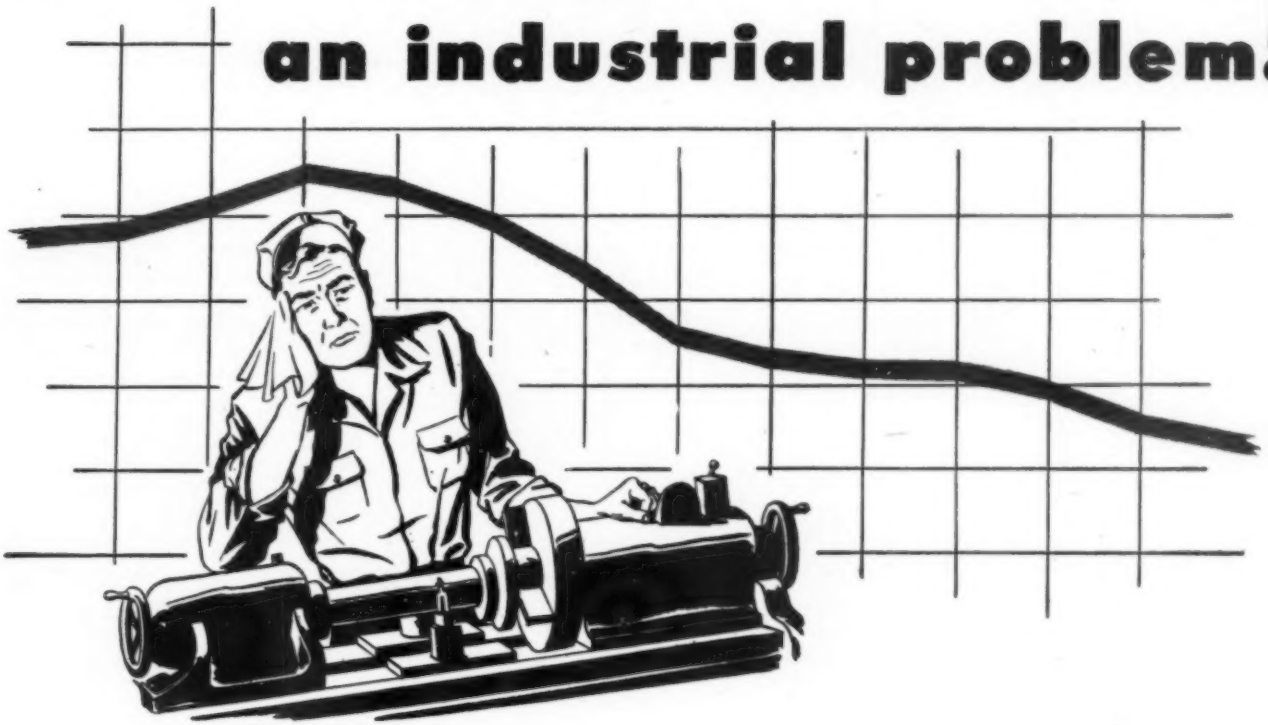

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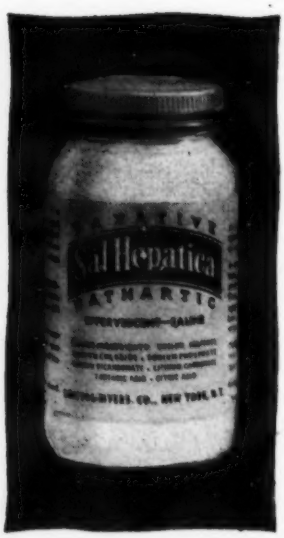

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many of our state laws make little, if any, distinction between the liability of the employer in cases of disability arising directly out of employment, or such liability being the result of an aggravation of a pre-existing pathological state.

The prospective employee should be informed that the pre-employment examination is for the purpose of safe placement at work. It has been our experience that she readly accepts any examination that serves to protect her against disability or the aggravation of an already existing disease. Knowledge of past gynecological or obstetrical pathologic condition, along with pelvic examination, is a fundamental inclusion in adequate health maintenance programs for the industrially employed female worker.

GYNECOLOGICAL Problems of Established Employee: Definite gynecological disease arising solely from an occupational cause is rare. Aggravation of a previously existing condition is common, and gynecological symptoms that the employee attributes to her work are legion.

Dysmenorrhea—The problem of dysmenorrhea is one that has caused the industrial physician much concern—concern often to the point of exasperation. His experience differs radically from that of the gynecologist in the approach to a solution of this problem.

First, he finds an attitude of resignation to this periodic disability which is amazing—resignation to such a degree that it has rarely occurred to them to seek medical advice. In our series, less than 12% of those absenting themselves from one to three days each month, had ever requested an examination by their family physician.

Secondly, the discomfort of menstruation has previously furnished a large percentage of young women with an excuse to stay home from school or the avoidance of any unpleasant tasks. This attitude is carried into their factory environment where, with the mere mention of abdominal cramps, they expect leave with no questions asked.

Lastly, "epidemic dysmenorrhea" may be unknown to the gynecologist, but it has frequently been observed by the industrial physician. The transfer of *one* young woman to a different type of employment, when it was thought that the work she was doing was aggravating her symptoms, may bring many requests from other employees who seek similar changes, claiming similar disability.

What must the industrial physician include in his program of health maintenance that will tend to lessen the lost time from this source?

Wards should be provided in the industrial hospital where immediate relief can be obtained. The employee should *not* be sent home. Rest, local heat and simple medication soon return most of them to their work. However, it is during the intermenstrual period that the most beneficial results can be obtained. A sincere attempt should be made to correct the mental attitude of the employee. Correction of improper posture at work, resulting in poor muscle tone, often necessitates change or rearrangement in her job. The importance of proper diet and the avoidance of constipation should be emphasized. Frequently, systematic exercises are outlined and outdoor activities encouraged.

By following such a program, one industrial institution employing over 9,000 women, reduced the lost time from dysmenorrhea approximately 75%.

The industrial physician is responsible for the correction of conditions within the factory which cause abnormal changes in the congestive states of the menstrual cycle. It is not always the female employee who is on her feet all day, moving about before her machine, nor the one who is required to use her feet constantly in the operation of her job, who complains of dysmenorrhea. The women on the assembly lines, inspectors or clerks, who sit at tables or desks, find that these more sedentary occupations similarly cause alterations in their menstrual symptoms.

It is the industrial physician who must decide whether the employee should be relieved of strenuous tasks; advised to seek systematic exercise, or receive instruction in the physiology of menstruation that might result in a change in mental attitude towards this too often misunderstood normal function.

His must be a practical approach to this subject, for his ultimate goal is, after all, a type of health maintenance that reduces absenteeism and lessens disruption in production from this or any other periodic or repeated disability.

Finally, the industrial physician must always keep in mind that dysmenorrhea is but a symptom resulting from many conditions (pelvic inflammatory states, endometriosis, pelvic neoplasm, cervical stenosis, hormonal imbalance, et cetera) having nothing to do with employment. Such cases can best be treated by the employee's own personal physician.

Abnormal Menstrual Flow and Intermenstrual Bleeding — The medical departments of our manufacturing institutions, functioning as "fact finding" agencies, have an unequalled opportunity for the recognition of early gynecological disease. Abnormal menstrual flow and intermenstrual bleeding associated with ectopic pregnancy, threatened abortion, benign or malignant polyps, adenomyoma of the uterus, cervical cancer, etc., are frequently first observed in those departments. When it is recognized that there is no occupational explanation for these symptoms, the insistence upon prompt medical attention has resulted not only in shortening the period of disability, but frequently has saved the life of the employee.

The diagnosis of early pulmonary

"A Little Piece of Man"

Review by
W. P. SHEPARD
in American Journal of Public Health, July, 1947

A BLIND HOG'S ACORNS—by CAREY P. MCCORD, M.D. Chicago: Cloud, Inc., 1945, 311 pp.

Any book explaining and popularizing public health is of special value in these days of shortage of public health personnel. CAREY P. MCCORD dramatizes and enlivens the industrial health field in a series of charming stories, reflecting the vast importance of this field, while entrancing his reader with the art of the true raconteur, an art which his friends have long enjoyed when with him on field trips, at the luncheon table, and at meetings. This little biographical book brings the industrial preventive medicine story to the public with an effectiveness that ranks with "An American Doctor's Odyssey," "Plague on Us," and "Yellow Jack." . . .

The puzzling title is quickly explained in the first pages and becomes uniquely apropos when we learn that the author's childhood was warped by the edict of an itinerant phrenologist, who pronounced his "bumps all wrong—his head proves he just ain't fitten," whereupon his father decided he was still worth rearing since "even a blind hog gets an acorn once in a while." Thereafter the book contains such a surprising collection of tasty acorns of wit and wisdom, as to leave no question of the father's sound judgment.

As might be expected of one of his erudition, the author, try as he will to avoid it, lapses into technical language occasionally, having expressed himself thusly all these years. But the terms are easily understood and are used in a way which flatters the non-medical reader's intelligence. His basic tenet, that "a little piece of man" goes into every job performed by man, and that this constitutes a day-by-day process of attrition of body and mind, is well illustrated, and becomes the basis of the industrial hygienist's creed: to reduce that process to a minimum. His pursuit of the "chiclero's disease" in the jungle of Central America and finding it to be Leishmaniasis, the "four-o'clock mystery" when all workers in a large office became ill at four each day, his many experiences with the legal fraternity, his investigations of lead and dust hazards, and many other important contributions made to the young science of industrial hygiene are woven into nicely connected stories told with modesty, humor even at his own expense, and a rare piquancy. The illustrations by Strobel add much to the humor and style. This is good recreational as well as philosophical reading for anyone.

tuberculosis in those industrially employed has been a recognized factor in the reduction of the death rate from that source. In the case of cervical cancer, especially, a similar service may be rendered by the industrial physician.

One cause of excessive menstruation or intermenstrual bleeding is of particular interest to the industrial physician. It has been noted that female employees working with certain chemicals, such as trichlorethylene, benzol, carbon disulfide, T.N.T. and lead, occasionally give symptoms of increased menstrual flow or "spotting" between their periods. The question immediately arises as to whether these chemicals have specific effects upon the female reproductive organs or whether their symptoms are merely manifestations of low grade toxic absorption resulting in hemorrhagic condition of the mucous membranes in *any* part of the body. In the case of lead, it is believed that there is a definite effect upon the reproductive function and the menstrual cycle.

The industrial physician's responsibility in this instance is to see that female employees are properly protected from such exposures.

Pelvic Pain and Low Backache—These symptoms have been grouped together, for they are commonly associated in the minds of the female industrial worker. The industrial physician again finds himself in an unenviable position, for, even when the employee knows that she has an existing pathologic condition, she only too frequently claims that her job is solely responsible for her symptoms.

A decision must be made at once. Is the basis for her complaint an inflammatory disease, cyst of the ovary, uterine fibroid, endometriosis, etc., or do these symptoms actually arise from lumbosacral strain, excessive fatigue, or bad posture at work? Pelvic examination is as essential, in these cases, as x-ray examination of the chest when pulmonary complications may be suspected.

When the industrial physician finds that a definite pelvic pathologic condition is present, it is his duty to see that these employees consult their family physician as to proper treatment.

Pelvic Relaxations — With the increased employment of older parous women in our industries, the problem of pelvic relaxations and their aggravation by certain types of work must be studied. Constant jarring, found in some riveting operations, heavy lifting, repeated uses of the feet in working certain power machines, or the requirement of standing long hours at a time, certainly aggravate the symptoms arising from cystocele, rectocele or a prolapsed uterus.

Actually these women should not be employed at this type of work. Transfer to lighter employment is one solution. When this is impossible, the industrial physician should see that these women be given sufficient rest periods to avoid excessive fatigue. Certainly it is his duty to examine the employee at frequent enough intervals to know whether her condition is becoming worse in spite of any change in occupation he may have insisted upon.

The male employee with hernia is given every attention. The problem of pelvic relaxation in the female must receive equal consideration.

Menopause—The menopause, with its associated nervous and vasomotor instability, increased excitability and susceptibility to fatigue, along with frequent attacks of vertigo, limits the type of work that these female employees should be allowed to do.

It is the responsibility of the industrial physician to recognize menopausal symptoms, see that proper medical care is instituted by the employee's own physician, and insist that she be placed at tasks requiring less nervous energy and concentration. Sympathetic understanding on the part of the industrial physician goes far in lessening lost time during this trying period.

Pregnancy — No phase of health maintenance for women in industry has received as much attention as that concerning pregnancy. The main problems involved are: should the employee continue at work once the diagnosis of pregnancy is established; under what circumstances should she be allowed to continue, and, if allowed to remain, what particular types of employment are safe, and what toxic exposures must be particularly guarded against.

State laws on this subject are few and inadequate. But four states (Massachusetts, Connecticut, Vermont and Missouri) legalize the length of time the pregnant employee may remain at work, while only six (Washington, Connecticut, Massachusetts, New York, Vermont and Missouri) specifically state when she may be legally returned to work following the birth of her baby.

The industrial physician receives little guidance from this source. For example, a woman may, legally at least, be kept at work in Massachusetts or Vermont until two weeks before the estimated date of delivery, while in Connecticut, New York or Massachusetts she may be employed four weeks postpartum, and in Missouri it is legal to place her at work in three weeks.

Fortunately, specific recommendations concerning pregnancy in the industrial female worker, have been prepared by the Children's Bureau, the Women's Bureau of the U. S. Department of Labor, and the Committee on Health of Women in Industry of the American Medical Association. These recommendations have been of great assistance to the industrial physician in formulating policies adaptable to the particular type of industry he serves.

A summary of these recommendations follows:

1. The labor situation in this country does not necessitate the recruitment or employment of pregnant women.

2. The employee, upon realizing that she is pregnant, should be urged to report her condition immediately to the industrial medical department, the Girls' Counselor, or to the superintendent of her department, so that transfer to lighter or less fatiguing work may result.

3. There should be no exposures to toxic substances considered to be extra hazardous during pregnancy, such as analine, benzol, toluol, carbon disulphide, carbon monoxide, chlorinated hydrocarbons, lead, mercury, nitrobenzol, phosphorus, radioactive substances or any other toxic substances that exert an injurious effect upon the blood-forming organs, the liver, or the kidneys.

4. Facilities for adequate pre-natal medical care should be readily available for all employed pregnant women; they should be instructed as to

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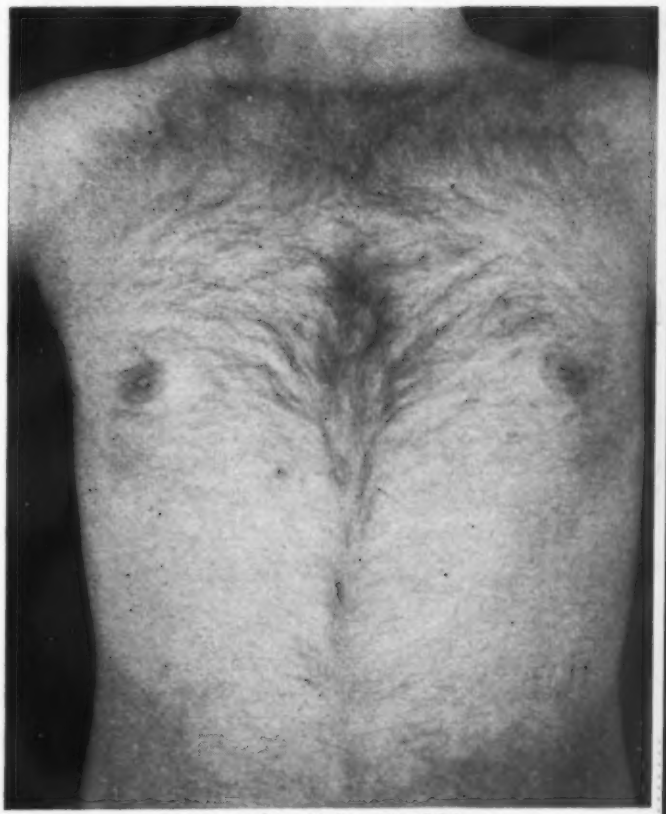

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the importance of such care. Many industrial institutions require a note from the family physician stating that pre-natal care has been instituted before the employee is allowed to continue at work.

5. A minimum of six weeks' leave before delivery should be granted. (The word "minimum" should be emphasized, for in many occupations employment beyond the six-month period is extremely hazardous.) It might be added that, where there is a previous history of repeated abortions, severe toxemias, existent pyelitis, kidney or heart disease, serious varicosities or sacro-iliac difficulties, the employee should be placed on a medical leave of absence, and the industrial physician should furnish the obstetrician with any data he may have accumulated concerning this individual, such as reports of urine analyses, blood pressure readings, blood tests, x-ray findings, etc.

As the disability rates for premature termination of pregnancy are rising, closer cooperation between the industrial physicial and the obstetrician is mandatory.

6. It is recommended that, in uncomplicated cases, a period of six weeks should follow delivery before the new mother should be returned to work. (Here again, that this is a "minimum" period should be given emphasis.)

This last recommendation is one which causes the industrial physician considerable apprehension. The Unemployment Compensation Commission Act complicates the decision he has to make.

At the time of the final postpartum examination, the employee requests a statement from her physician that she now is able to return to work. She then goes before the commission, using this note to establish that she "is able and available for her previous position." This being established with the commission, she is referred to her former employer.

At this point, the industrial physician is in difficulties. If he is hesitant about placing the employee at work, feeling that her job at the factory and her added responsibilities at home are more than she is physically capable of doing without damage to her health, she then is entitled to unemployment benefits. If he indiscriminately approves these new mothers for return to work, using the family physician's note as his authority, he is certainly not forwarding his health maintenance program.

This is but another instance where a better mutual understanding of the problems of the industrial physician and the family physician would benefit both and the employee as well.

CONCLUSION: The industrial physician's consideration of gynecological and obstetrical problems is but a part of his health maintenance program. His ultimate objective is safe placement at work, the reduction of sick absenteeism, and the correction of working conditions that may result in disability or aggravation of an existing disease.

It can be definitely stated that such a program cannot be developed without the cooperation of the physicians in private practice. Further, the extent to which these programs are successful depends directly upon the amount of understanding of each others problems.

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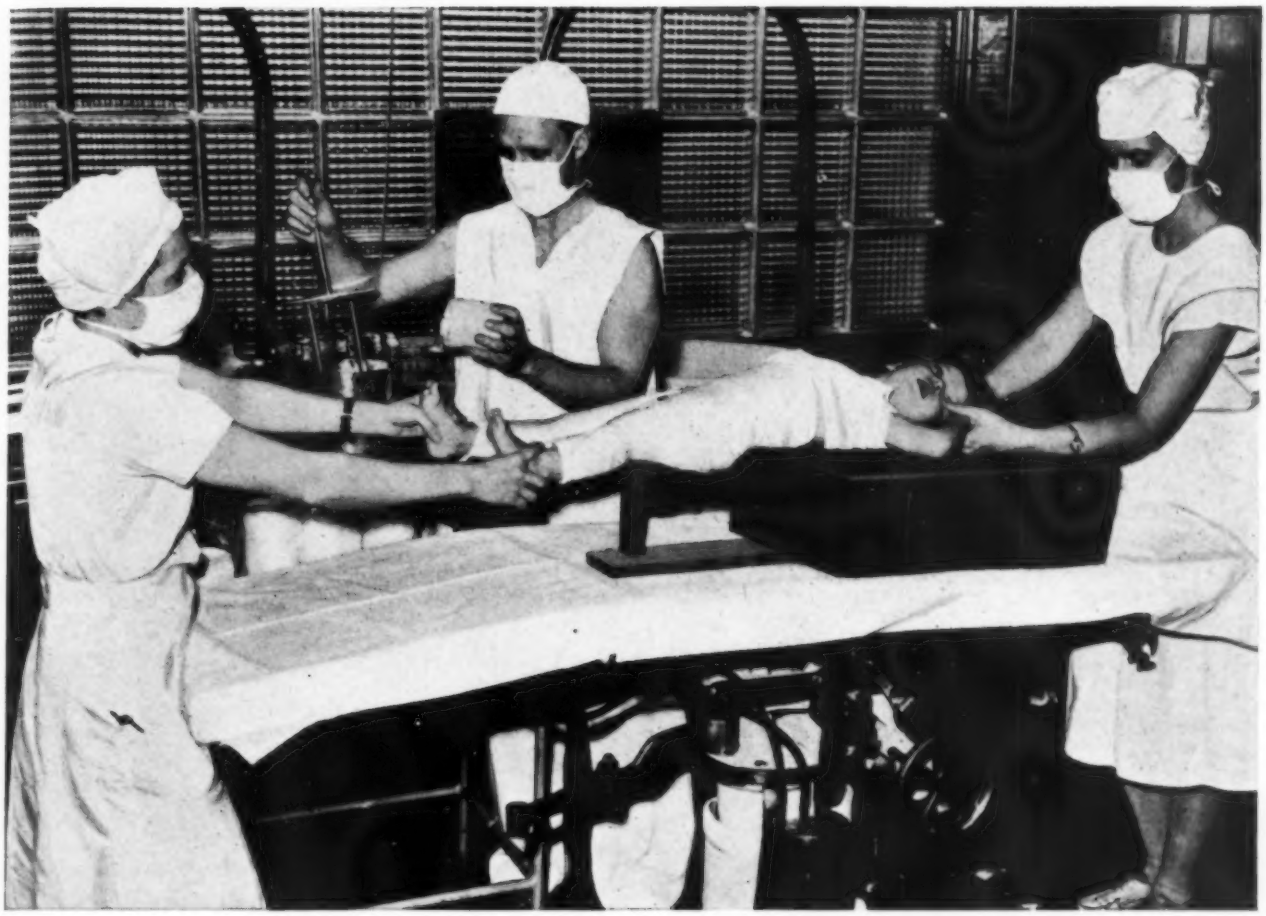

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